CHEMICAL LIBRARY 29 1921 OF MICH

GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. CLI. No. 2983.] LONDON, JULY 14, 1920. [72nd Year. Price 8d.

OXIDE OF IRON
SPENT OXIDE

GAS PURIFICATION AND CHEMICAL CO., Ltd.
PALMERSTON HOUSE, LONDON, E.C. 2.
Telegrams: "PURIFICATION, LONDON."
Telephone: 9144 London Wall.

PUMPING ENGINES
All Types for ACID, &c.
CAST-IRON OR STEEL TANKS
Any Capacity.
CHEMICAL PLANT.
Roofs and Girders. Structural Work.
SULPHATE OF AMMONIA PLANT
Air and Gas Compressors.
MIXERS.
TAR STILLS AND CONDENSERS.
W. NEILL & SON, Ld.
Engineers, Iron & Brass Founders,
ST. HELENS JUNCTION.
Telegrams: 'Neill, St. Helens.' Telephone No. 20.

PURIFYING MATERIAL
"Brownox-de-Luxe."
Unqualified Satisfaction given where used.
SPENT OXIDE PURCHASED
J. BROWN & CO., Ltd.
Savile Town, DEWSBURY.

TORBAY JOINT STOPPING
FREE FROM LEAD.
The TORBAY PAINT CO.,
26/28, Billiter St., LONDON, E.C. 3.
39/41, Old Hall St., LIVERPOOL.

"BLUEBELL" SILICA RETORTS
(95% SILICA)
John G. Stein & Co., Ltd.,
Castlecary, SCOTLAND.

Makers of
GASHOLDERS,
TANKS (C.I. or Steel),
PURIFIERS,
WASHERS,
ROOFS,
&c.
ASHMORE, BENSON, PEASE & CO., LTD.
STOCKTON-ON-TEES.
Complete GAS WORKS
London Office:
39, Victoria Street, Westminster, S.W.
Telegrams: "GASHOLDER."

W. & B. COWAN
(Incorporated in Parkinson and W. & B. Cowan, Ltd.),
LONDON. MANCHESTER. EDINBURGH. GLASGOW.
SYDNEY. MELBOURNE. BRISBANE. WELLINGTON, N.Z.
(See Advertisement on page III. of Wrapper.)

JAMES McKELVIE & CO.
Coal Owners,
Gas and Steam Coal Contractors,
17, RUTLAND SQUARE, EDINBURGH.
59, MARK LANE, LONDON, E.C.
GUILDHALL CHAMBERS, SANDHILL, NEWCASTLE-ON-TYNE.
24, CHAPEL STREET, LIVERPOOL.
ESTABLISHED 1840.

STEWARTS AND LLOYDS, LIMITED, 41, OSWALD STREET, GLASGOW. BROAD STREET CHAMBERS, BIRMINGHAM.
TUBES & FITTINGS for Gas, Steam, Water, &c.

THE "STANDARD"
SLOT METER
Extremely simple and accurate in working; all Meters tested at 30/10ths pressure as well as the 5/10ths prescribed by the Sales of Gas Act. Can be fitted with STRONG BOX if desired, or with patent "M & M" LOCK of exceptional strength and security.

The following recent appreciation is typical of many received from Gas Undertakings :—
"I do not think the Directors will ever care for any other make of Prepayment Meter, as I find them so very satisfactory in every respect."

GEORGE GLOVER & CO., Ltd.
Ranelagh Works.
Royal Avenue, Chelsea, London, S.W. 3.
Telephone: Kensington 1140.
Wires: "Dry Meters, London."

R. & J. DEMPSTER, LTD., 34, VICTORIA STREET, S.W. 1. CONNAUGHT MANSIONS, MANCHESTER.
"NOTIA NOS" PAN ASH, COKE BREEZE & COAL WASHER.
HEAD, WRIGHTSON, & CO., Ld. SOLE MAKERS OF THE

FERNDOWN ELASTIC PAINT Does not blister or "chalk" off.
THOS. THORP & CO. (London), LTD. BERMONDSEY, LONDON, S.E. 16.

W 659.

W 659. 1-LIGHT.
Length over all 18 in.
Dia. of Reflector 15 in.

W 655. 2-LIGHT.

W 656. 3-LIGHT.
Length over all 25 in.
Dia. of Reflector 21 in.

W 657. 2-LIGHT.

W 658. 3-LIGHT.
With Parabolic Reflector.

A Lamp of Distinction for Outdoor Shop Lighting

Supplied in 1, 2, or 3-LIGHT, with or without Parabolic Reflector.

Fitted with Angle Inverted Burners.

Outside Gas and Air Adjustment and Flash By-pass.

The Casings are made of Steel, and Finished in Dark Green Enamel.

NO INNER GLASSES REQUIRED.

Catalogue and Prices upon Application.

WELSBACH

BRITISH MADE

GLADIATOR LAMPS

ADVT. OF THE WELSBACH LIGHT COMPANY, LTD., WELSBACH HOUSE, KING'S CROSS, LONDON, W.C. 1.

B DONKIN D

DONKIN

for

HIGH-PRESSURE GAS PLANTS

ROTARY AND RECIPROCATING COMPRESSORS :: DISTRICT AND SERVICE GOVERNORS :: PATENT DOUBLE FACED VALVES.

THE BRYAN DONKIN COMPANY, LTD.,

Head Offices & Works, **CHESTERFIELD.**

LONDON OFFICE: 3, VICTORIA STREET, WESTMINSTER, S.W. 1.

Chesterfield Telephone No. 84.
London Telephone No. 5358 Victoria.

Chesterfield Telegrams, "Donkin, Chesterfield."
London Telegrams, "Donkin, Vic. London."

B CHESTERFIELD D

GAS JOURNAL

LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CLI., No. 2983.] WEDNESDAY, JULY 14, 1920. [72ND YEAR.

EDITORIAL NOTES.

The Settlement.

THE terms of the settlement arrived at, by conference, in connection with the wages, week-end payments, and holidays demands made by the Federation of General Workers, on behalf of the gas workers of the United Kingdom were published in last week's issue. They have since been much discussed throughout the industry; and in one section of the country they have been the cause of grave acts of disloyalty on the part of workers to elected representatives, and to considerable sections of the community. The settlement was come to in circumstances of great difficulty and delicacy by the Federation of Gas Employers; and we are glad to know that it has received the approval of the vast majority of gas undertakings. There is no intention on our part to discuss the terms; to do so would be foolish in view of the happenings in the Manchester, Potteries, and other areas. But there are considerations which, we believe, influenced the settlement which may with advantage be brought to the notice of readers.

In the first place, the claim (following the now generally adopted policy of trade unions) was a national one. This fact had to be accepted and faced; and it had to be anticipated that if, unfortunately, a strike arose from the claim, it would also be a national one. National strikes—this can be said emphatically—can only be defeated if public opinion is on the side of the employer. Now what was the industry's situation in regard to the claim? There was the Gas Regulation Bill in Parliament (it is now well on the road to becoming an Act), which will enable gas undertakings to pass on to the consumer unavoidable increases in costs and charges. The general public would not have supported the employers in the gas industry once they became aware of the facts that—(1) The gas workers did not receive similar benefits to those paid in the engineering industry, which had usually been followed in the past; and (2) that the increased wages charges would in future fall not on the share or stock holder but upon the actual consumer of gas. Then, again, it must be remembered that the gas industry differs from the majority of industries, not only by reason of the difference in the size of the undertakings, which are situated in every town and village throughout the country, but also the nature of the district, which varies from agricultural to large industrial centres, as well as by reason of the fact that so many undertakings are owned by municipal authorities, the gas committees of which have generally in their composition trade union representatives. A further factor (which perhaps is the most important of all) is that it would have been impossible in the industrial centres for gas undertakings to have retained their employees, unless an increase in wages at least comparable to that granted in the engineering industry had been conceded. In many instances, as is commonly known, gas undertakings have been much handicapped by their employees seeking more remunerative work elsewhere. As matters stand, the agreement has been received very badly in the industrial centres, as is evidenced by the strikes to which reference has already been made.

A point that will be of particular interest to the small undertakings is that a great step forward has been taken to protect their interests in future by inducing the trade union representatives to form immediately a Joint Committee with the Federation of Gas Employers to arrange for "grading" undertakings in the industry. If once a scientific and equitable scheme of grading can be agreed upon, many of the difficulties of to-day will be eliminated.

The other demands raised by the trades union representatives have been settled without doubt upon a mutually reasonable basis both for the employer and employee. All reasonable employers recognize now the necessity of granting a normal working week's holiday to gas workers. The daily overtime rates, too, are in consonance with those prevailing in the engineering trade; while no consumer will grudge the increased charges he has to pay by reason of the fact that time-and-a-half rates for the three shifts on Sunday will now obtain. The men on their part must recognize that they are employed by a public utility service which is a continuous process, and that they cannot therefore expect the same overtime rates (double time) as are usually paid in seasonal trades and industries. For the same reason, the employers felt that they were not justified in granting the claim for overtime rates for Saturday afternoons. The question of nationally proclaimed and ordinary bank holidays was, in the opinion of the Gas Employers' Federation, essentially a matter for regional settlement, having regard to the diverse customs and practices now in existence in different parts of England. So much for the settlement.

Unsettlement in the North and Elsewhere.

THE agreement, unfortunately, has not been unanimously accepted by the gas workers; the principal disaffected area being Manchester and Salford, and away to the Potteries district—several towns being involved—with isolated cases in other parts, such as Bristol, Weston-super-Mare, and one or two places in Wales. The Manchester men came out on strike on Wednesday—not merely for a short duration as a protest against the full measure of the terms demanded not having been conceded and agreed to, but with a then determination not to resume work, though no strike pay be forthcoming, until the terms originally demanded were granted. The strike was entirely unauthorized. As a matter of fact, the conference of representatives of the Executives of the Unions concerned in the agreement on the previous Monday "recommended the Executives of the "affiliated unions in connection with the gas industry not to "sanction or authorize a strike which aims at repudiating "the agreement." The determination of the men to hold out for what they deem to be their full pound of flesh had more strength than the reasons they could advance for their unconstitutional methods of showing their dissatisfaction; and this applies to the whole of the 5000 men or so who were reported to be "out" towards the end of the week. The only ground that can be discovered for their action—and it is not a sufficient excuse—is that they thought they ought to have been consulted on the matter before final acceptance of the terms. This is not a course that has been hitherto adopted in connection with the trade unions with which the gas workers of the country are identified. Negotiations have been conducted and agreements made on the understanding that the representatives of the trade unions possess plenary powers; and there has been dutiful acceptance of their decisions. What is the good of having trade union leaders to negotiate—or what is the good of negotiations at all—if the results are to be turned-down, and the original claim, whether just or otherwise, is to be regarded as the irreducible minimum, and the only alternative a strike?

There is no question that the Manchester men and the gas workers of other towns who have supported them, or have taken independent like action, have done infinite harm to trade unions by shaking public confidence in their power to represent, and act on behalf of, the men on a national basis. The men deny that they have thrown over their leaders. According to report, they avow "that they have

" only dispensed with their services for the time being, and " are putting them in their places as their servants." If this is so—and we do not believe a tithe of the workers of the industry would endorse any belittlement of their leaders——it comes to this: As national settlements can only possibly be arrived at through accredited representatives, national settlements must go; and if this sort of thing is not definitely abandoned there must be an early return to individual settlements—discussion and settlement between each gas undertaking and its own men. It was said by the trade unions that nearly 100,000 men were concerned in this last application. If this be so, the men on strike only represent about one-twentieth part of them, which shows they are in a hopeless minority in declining support to their leaders. Now what would these men have said had their employers repudiated the agreement, and locked them all out as a protest against the action of the Gas Employers' Federation? There would have been a perfect flood of oratory on the subject from workers' representatives, and vehement resentment from workers themselves, with a very fine newspaper condemnation. With the necessary conversion of terms, words used by Alderman Kay, the Chairman of the Manchester Corporation Gas Committee, would then have applied as much to the Employers' Federation as they do to the trade unions. " If," he remarked, " the men are not willing to abide by the pledged word " of their leaders, then the whole system of trade unionism will come to an end." And that is the truth of the matter. The leaders realize this. The municipal authorities realize it. The men must do the same; and despite their defiant attitude, they know full well that their extreme action is disloyal to their unions, and to the communities who are their employers, and therefore whose servants they are.

The improved outlook on Monday was something for which to be thankful. Mr. J. R. Clynes, M.P., the President of the Federation of General Workers, visited the storm centre of Manchester, and urged the men to adopt more constitutional methods. His attitude was conciliatory but firm, as befitted the circumstance of an open revolt against the leaders, and their part in the national settlement. The course taken was that nothing whatever could be done until the men returned to duty; and there were symptoms that this view would be accepted. The Salford men appeared much more amenable to reason; and they passed a resolution appointing two delegates to interview Mr. Clynes, with the object of obtaining a written guarantee that, if the strikers returned to work, their demands should be considered, and a decision given within seven days. This meant quick work. But an agreement indicates two or more parties; and no guarantee could be given by one party without consultation with the other. There was some talk from the side of the men that they should have had placed before them a full and clear exposition of the meaning of the agreement, and of the improved conditions which it confers. But their attitude at the start showed that they had not failed to appreciate that the complete demands made in their name had not been agreed upon, and that to attempt to force the whole claim was the reason for their rash and indefensible action.

The New Gas Legislation Makes Progress.

AFTER an explanatory statement by the Marquis of Londonderry, the House of Lords gave on Thursday night second reading to the Gas Regulation Bill; and it was referred to a Committee of the Whole House. There was no discussion at this stage. His Lordship showed excellent cause for the passing of the Bill, and for a revision of legislation for the gas industry on a permanent basis. This is incontrovertible. The present situation of the industry placed in contrast with the pre-war position is sufficient proof. This position the Marquis of Londonderry well understands. He knows, too, of the impairment of the industry's financial credit, through the new conditions that have taken definite and lasting shape during and since the war; and he realizes that no mere patchwork legislation, such as the Statutory Undertakings (Temporary Increase of Charges) Act, can restore the stability of the industry or the confidence of investors in its future. His Lordship also mentioned the patriotic services of the industry during the war, which alone should be a commendation of it to the generous consideration of Parliament. But patriotism does not (and his Lordship did not suggest it) supply a single reason for the revision of our statutory enactments. Revision implies the presence of defects; and statutory restrictions and terms as applied to the gas industry are full of defects to-day, through the changes that have arisen in economic conditions which are fundamental to the restrictions and terms in existing Acts and Provisional Orders. The Bill as it now stands supplies remedial means; and we do not think, after the thorough overhauling Standing Committee A of the House of Commons gave it, the House of Lords in Committee should have much (if any) modification to make.

A point that Mr. Bridgeman and the Marquis of Londonderry have made perfectly clear is that there is to be in the ordinary Orders no modification of the sliding-scale other than in respect of terms, which will also have to be adjusted to the heat-unit basis. If change is required other than in terms, it will be necessary to proceed under a provision of sub-section 2 of clause 10, which empowers the Board of Trade, by Special Order, " to modify or amend the provi- " sions of any Special Act, or other provision relating to the " undertaking affected by the Special Order, as may be " necessary to provide for the proper and efficient conduct " of the undertaking." Or, alternatively, any undertaking will be able to proceed by Private Bill, to amend their conditions, the same as the South Metropolitan and South Suburban Companies have done. It looks as though the first-named Company are going to get " home " first. Their Bill has been before the Unopposed Bills Committee of the Commons, and has been reported for third reading. The House of Lords might remember, when considering the Gas Regulation Bill in Committee, that these Private Bills, which were discussed exhaustively before a Select Committee of their Lordships' House, contain the two main features of the Government Bill—the conversion of operation and charging to the heat-unit basis, and the revision of financial terms. The South Metropolitan Bill goes still farther. It sets up a revision of the sliding-scale, and establishes the principle of a minimum dividend (which will be a protection to investors in future), of which we very much approve, though we wish the minimum on the existing capital had been 6 p.ct. instead of 5 p.ct.—the former being the minimum (of course, subject to it being earned) on new capital. Thus if any undertaking wants to adopt the precedent which will be created by the South Metropolitan Gas Company in respect of the remoulding of the sliding-scale and the investing of capital with a mimimum dividend to protect the stockholders against a disastrous slide due to extraordinary circumstances, then it will be necessary to apply to the Board of Trade for a Special Order or else go to Parliament with a Bill.

Meanwhile, steps are already being taken in matters consequential to the passing of the Gas Regulation Bill. Draft Orders in Council have been laid before Parliament providing for the transfer from the Ministry of Health to the Board of Trade of the powers and duties of the former relating to local authority gas undertakings, the power to sanction the purchase by an urban council of a gas company's undertaking, the power to substitute a standard of calorific power, &c., in respect of gas supply by a local authority, and the power to modify statutory provisions regulating the charges to be made by local authorities carrying on gas undertakings. The Draft Orders authorizing this transfer of functions and powers will have to lie before each House of Parliament for thirty days; and they are subject to the approval of both Houses. But this indicates the beginning of preparation for the Bill receiving the Royal Assent, and the Act coming into force.

More Coal Trouble Brewing.

THE autocrats and the real coal controllers of the mining industry—the Miners' Federation—have been meeting at Leamington, and have been hatching fresh discomfort for the country, and reiterating their intention to make use of their resources and power to over-ride the decisions of a Legislature elected not by the Miners' Federation, but by the whole country. The members of the Federation, of course, helped to establish the Legislature for political purposes; but that in their view is quite a subordinate matter to their own ideas and will. If the decisions of the Legislature do not agree with those of the Federation, though the legislative decisions are in conformity with the desires of a majority of the electorate, the Miners' Federation claim the right to use the force they possess to veto all they object to. The position that has been created at Leamington, Mr. Smillie describes as serious, and contains the elements of a

grave crisis. We believe him; but still, were it not for the Miners' Federation, the position would not be serious, and there would be no elements of a grave crisis. There is no justification for the new threats. Of this we may be positively assured, that if the Government give way now to the Federation, they will have good cause to rue the day. The one objective of the strategy of the Miners' Federation is nationalization; and nationalization embodied in a form of their own design will commit the whole country to destructive conditions.

The excuses for the new position and the fresh trouble are found in the decision of the Government to clothe the mining industry with economic soundness. The Miners' Federation calculate that there will be a surplus this year of £66,000,000, taking the first three months' working as a criterion. So they have determined that 14s. 2d. per ton must come off the price of domestic coal (the 4s. 2d. per ton on industrial coal is conveniently overlooked, though the Federation have been talking much about reducing the cost of living), which will absorb £36,000,000, and the balance of £30,000,000 they propose to appropriate by increasing the wages of the miners above 18 years of age by 2s. a day, of those between 16 and 18 years by 1s., and 9d. for boys under 16 years. If the 14s. 2d. reduction in the price of household coal is refused, then a larger increase of wages will be sought. If the miners are anxious to see the cost of living to householders reduced, why not devote the whole of the £66,000,000 that they calculate as surplus profits to this purpose, and give householders a reduction of something like 27s. per ton, instead of only 14s. 2d.? There would certainly be a show of sincerity about this, particularly if it included the coal carbonized for providing gas for household purposes, seeing that the gas industry is a purveyor of a labour-saving fuel to the homes of the United Kingdom, including those of trade unionists. Such a novel proceeding does not appear to have occurred to men who have done so much to advance the cost of coal through an abnormal increase of wages, shorter hours per day (many of them putting in much less than 42 hours—some less than 35 hours—a week), and an output of about 215 tons per man per annum, against 259 tons in 1913. But they are not likely to take this self-sacrificing course. Up to a point we are with the miners. We should like to see any surplus profit devoted to a general reduction of the price of coal, because we have no sympathy with the Government taking profits from a trading industry and handing them over to the Exchequer, any more than we have for the policy of municipalities in taking profits from their trading undertakings in relief of the rates. But the Miners' Federation put forward a reason for not handing over the whole of the profits to the purpose of reducing the price of coal. It is now a question of the pot calling the kettle black. The miners to-day say that the workers in other industries have given no help whatever to the miners in their effort to reduce the cost of living, and that the railwaymen, dock workers, and others have secured for themselves the largest possible advance in wages regardless of the effect on prices. That is precisely what the workers in other industries are saying about the miners. So we have it confessed that the reduction in the cost of living has now been shunted by the workers; and it has become purely a race between them to see who can get the maximum reward for their reduced work. In other words, they are doing their best to bring disaster upon the country through higher costs and lessened production.

The questions of profits, increase of wages, and price of domestic coal do not end the plans of the Federation for over-riding the decisions of the country's elected Legislature. According to the Federation, there is nothing good in the Ministry of Mines Bill. If Parliament passes it, then the country is promised that the miners will fight it tooth and nail, and output will further decline. This patriotic declaration has been made on the ground that the Bill has been conceived with the idea of destroying the Federation. Sir Robert Horne has disclaimed any such intention; and the miners' leaders themselves know that such an idea would be altogether futile. The warning is also given that any district wages reduction brought about by the measure would be met by a general strike throughout the coal-fields. This shows that wage-fixing on a national basis has become an accepted policy of the miners as it has of many other trade unions. Still further, we notice that a resolution was passed last week to submit to the Trade Union Congress this week a proposal to "down tools" if the Government reject the demands of labour concerning Ireland and Russia. The function of a trade union appears to be expanding at an alarming rate.

However, it is pretty clear that it would be idle in present circumstances to look for any reduction in the price of coal or an increase of supplies. Consideration had better be directed by gas managers to obtaining possession of any supplies that may be available.

Dr. Davidson and Inerts.

IN the almost overwhelming variety of subjects which are contemporary in the gas industry, one is sometimes prone to overlook the work of earlier investigators into questions which are now matters of very live interest. We are reminded of this, by reference, in an article on "Town Gas" which Dr. W. B. Davidson has contributed to our columns to-day. In his Institution paper in 1913 on "Liquid Purification," he cited the results of experiments he had made on the effect upon flame temperature and incandescent lighting of mixing up to 10 p.ct. of carbon dioxide and nitrogen (separately) with straight coal gas containing about 12 p.ct. of inerts—very much on the lines adopted by Mr. James W. Wood in his investigations on behalf of the Gas Investigation Committee. But no notice has been taken by the latter of the results of Dr. Davidson's work which were published seven years ago. The investigation was not carried so far as that of Mr. Wood; but the results of the workers are corroborative the one of the other, though there are differences of figures—that for high-temperature work such as incandescent lighting and furnace operations a lower limit to inerts in the gas itself is necessary than for low-temperature operations, and that carbon dioxide is a worse offender than nitrogen. That is the general result. But taking Dr. Davidson's figures, up to 10 p.ct. addition of either constituent the reduction in flame temperature cannot be called considerable. In one example, the reduction of flame temperature with the addition of 10 p.ct. of carbon dioxide was only 4·55 p.ct.; and with 10 p.ct. nitrogen added, it was merely 3·5 p.ct. But the illuminating power, using an upright incandescent burner, was reduced by 17·7 p.ct. with 10 p.ct. addition of carbon dioxide, and by 12·5 p.ct. with the addition of nitrogen. Dr. Davidson thinks that the average decreases in illuminating power would probably have been higher had he carried the work farther—by adding larger proportions of incombustibles. There is, however, something of a challenge in the incidental remark by our contributor, that he did not in any of his tests obtain the remarkable results of Mr. Wood—"viz., that the first additions of nitrogen to a good coal "gas effected no reduction in the candle power produced "per thermal unit." There are, of course, many factors that have a bearing on exactitude in incandescent burner tests of this sort; and unless there is every assurance of precision, a slip and a wrong deduction over such a point as this may be easy. But after all, whether or not the deduction quoted is correct, interest in it is more academic than practical—which is not a suggestion that Mr. Wood should not deal with the point if he so desires.

However, we have now within reach legislative sanction to the sale of B.Th.U. instead of cubic feet; and overpulling will then die a natural death. Gas engineers will have no occasion to resort to the practice when their make per ton will be spoken of in B.Th.U., and their revenue will be obtained from sales upon the same basis. As Dr. Davidson points out, it will not then be of the slightest use to over-pull, because it will only increase per heat unit the costs of condensation, washing, purifying, storage, and distribution. We want to sell heat units at as reasonable a price as possible; and it would be sheer folly to put any unnecessary cost upon the heat units in order to gratify the whim of measuring working efficiency (a much abused term in this connection) by the cubic feet of combustible gas and an x quantity of inerts passed through the meter per ton of coal carbonized. Other points in this connection are made by our contributor, who is as deeply in favour as the rest of us of turning into gas as much as possible of coal, coke, or tar-oil as is profitable from all points of view. But at the same time he urges full consideration of certain virtues and defects of various components of town gas; and in conjunction comments are made which will be marked with interest. Among other points it will be seen that Dr. Davidson is not prepared to endorse the little band of super gas-refiners who went to the Board of Trade pleading, *inter alia*, for a maximum percentage of carbon monoxide and a

minimum percentage of methane being prescribed. Among other points discussed by our contributor is as to whether one B.Th.U. is as good as another; and the conclusion is that for high-temperature work a B.Th.U. served up with an excess of inerts is not so good as one served up with a low percentage of inerts. There is more truth in the submission when dealing with low-temperature work, though the proportion of inerts be very high.

The Mantle—Home Produced and Imported.

Early in the war many gas men made certain resolutions regarding trading with the then enemy after the war, subject to the possibility of satisfying requirements from home productions. The question is a very big one; and it has all sorts of economic ramifications. In those early days of the war, the impossible was easily achieved in the abstract, but the time has come when the attempt to put the impossible into concrete form and practice fails, and that grotesquely. We realize now that there are things which we must have from Germany. We also know that if all the Allied countries boycotted German manufactures, and refused to trade with the country, the chances would altogether vanish of ever handling the money representing the indebtedness of Germany to the Allies. Good resolutions in this case are subject to economic expediency, and more. But there are directions in which no need exists for carrying on business relations with Germany; and there are very good reasons why gas undertakings should not do so. For instance, there are incandescent mantles. Good resolutions were made regarding them in the early days of the war. Are these resolutions now being kept? Are gas undertakings refusing to buy any but home-produced mantles? Are they urging retailers and the consumers against having anything to do with mantles—mostly inferior ones—that do not bear indisputable evidence of being home manufactured? We hope they are. Because, though we know there are complaints as to the prices of British mantles, and delays in supply (which are matters for the makers to deal with), we do not forget that before the war, and in the early days of the war, the mantle business in this country was largely dominated by German finesse, which had given large control not only in respect of British production, but in restricting that production. And yet we were during the greater part of the war absolutely dependent upon our British manufacturers for the maintenance of mantle supplies.

Before the outbreak of hostilities, those manufacturers were wholly at the mercy of German makers of thorium for supplies; and they took good care not to allow the supplies to be too liberal, so as not to spoil their own market for second-rate mantles and worse—mantles destitute of all virtue, and which did much to discredit incandescent gas lighting. These are things to be remembered to-day, when the lines of communication are again open, and the flow of mantles from abroad is weekly gaining in strength and velocity. The Government sometimes only half do things. During the war they gave our British mantle manufacturers protection in regard to the Travancore monazite sands and thorium supply. We are no longer dependent upon supplies controlled in Germany. But the Government have given no satisfactory protection to our manufacturers against the competition of mantles of inferior types made in Germany, and made from the thorium obtained from sands that are not procured from a part of the British Empire. It is a curious condition of things. A Bill was introduced some time since to safeguard "key" industries, and to prevent dumping to their disadvantage. Gas mantles appeared in the schedule; but there is the authority of the Chairman of the Welsbach Company for saying that mantles are being largely imported to-day disguised and bearing false markings, and their actual place of birth is not disclosed. Before the war the gas industry had a good insight into the unscrupulous tactics of certain of the German makers; there was evidence of their wiles during the war; there is plenty of testimony of their life and intentions to-day. The gas industry, in helping to protect the British makers from these men, will be assisting to safeguard itself from the ill-effects of inferior articles, which are so baneful to the gas-lighting business.

To-day more than ever, with lighting competition what it is, it is necessary to maintain at a high standard lighting efficiency and economy in accessories. There may be a temporary saving in buying an inferior German-made article coming into the country under false pretences, but there is not genuine economy in it, nor is it an aid to the maintenance of our industrial reputation. There has been much to tax our minds the last few years, and there are matters that may be overlooked. We ask the gas industry not to allow mantle transactions to be one of them.

Gas and Housing Schemes.

The conference at Norwich organized by the British Commercial Gas Association with the aid of the Chairman (Mr. Henry Woodall) and Directors of the British Gas Light Company, and their Engineer (Mr. Thomas Glover) was a success in the broadest sense of the term. Mr. Woodall was in the chair; and we are glad to see him coming out more into the public life of the industry, and so following in the footsteps of his father, to whom the gratitude of the industry is imperishable. There was much said at the conference—the topic of the housing scheme predominating; and many useful points were made. There are two things that are certain. One is that the authorities now see more clearly that anything that spells extravagance in the housing schemes must be eliminated; and the other is that the farther investigation is carried by unprejudiced authorities, the more they are becoming persuaded that, for all-round advantages, gas possesses economies for the purposes in view that cannot be rivalled by electricity. In respect of capital cost, the housing schemes cannot stand two services for lighting and heating purposes; nor can the pockets of consumers in respect of running costs. We are glad to hear from Mr. F. W. Goodenough of the encouragement that is being given by H.M. Office of Works; and we trust his hope will be fulfilled that the Ministry of Health will endorse a standard specification for piping. They should have no difficulty in this respect, in view of the fact that piping should be of a calibre sufficient for the requirements of the present, and of the future—a lesson we have learned from the carrying deficiencies of pipes originally put in for lighting purposes only.

Points for the Authorities.

A point that came from Mr. Woodall cannot be made known too widely. It is that, by dispensing with kitchen ranges and fire places (other than, say, in the living room), a saving of about £50 per house can be effected, while the gas apparatus to be installed would not cost more than some £20. In these circumstances, he hopes the housing authorities will bear a large proportion of the cost from the economies to be obtained by banishing coal, so as to save the tenants of the houses the capital charges which would necessarily have to fall upon them in the price of the gas if the apparatus was supplied by a gas company. This is not the time to be penny wise and pound foolish. The Ministry of Health Committee on Smoke and Noxious Vapours Abatement have given a good lead in this matter; and Mr. Glover, at the conference, made a point which local authorities should turn over in their minds until they realize its meaning to them and their roadways. He mentioned that the gas made at Norwich was equivalent to about 60,000 tons of coal per annum. This is not the amount of coal carbonized; but the coal equivalent of the gas made. The gas equal to the 60,000 tons of coal is conveyed silently and invisibly to the places of use in the city. He asked those concerned just to think what it would mean to have to cart about the streets of the city 60,000 tons of coal in addition to that already burned in dwellings, factories, and business places. Local authorities should do their part in suppressing the use of smoke-producing coal, which has to be carted over the road surfaces (so contributing to their wear and tear), and favour the underground conveyance of fuel. This is a line—and a very important one—in urban progress.

Boring Passages for Pipes in Roads.

The idea of pipe-running in streets by opening-up at intervals two holes and boring an accommodation passage between for pipes is a fascinating idea if practicable. The advantages are plain; the disadvantages and limitations are equally so. Trench digging is expensive and laborious work in these days; the disturbance of the surface and the hindrance to traffic are conditions to be avoided, if possible; unless the roadway is paved, the route of the trench is visible for a long time; and also, unless the subsoil is of a very solid nature, the loosening of the neighbouring soil is a menace to other pipe-lines under the roadway.

There would be advantages (in addition to economy) of boring from one position to another, and pushing the pipes through the bored passage. But the holes from and to which the work was done would have to be fairly lengthy ones to enable the pipes to get a horizontal run. Boring would be no use in loose ground. We should be chary, too, about running a boring tool underground in the streets of our cities and towns, where there is often a perfect maze of underground tenants, and the chances of mischief are great. Of course, one might find the maximum depth of the other occupants of the subsoil, and go beneath them; but then there would be some set-off in having to trench to a lower level for making service connections. In rural areas, a different condition of things exists; and the danger of inflicting damage would be minimized considerably. However, we shall await with interest the results of the experiment which Mr. A. E. Collins, the City Engineer of Norwich, spoke about at the conference in that city of the British Commercial Gas Association. The experiment is being carried out by the Housing Committee of the Corporation, with the view of reducing the cost of laying sewers and pipes of all kinds. The holes in which the boring apparatus is used, and in which the pipe-running operations are carried on, Mr. Collins says may be as much as 150 ft. apart. There is no doubt about it, if the system can be made successful, the cost would be trifling compared with ordinary trench work.

Registering Large Volumes of Gas.

An article appears in another column which places before our readers a plain statement as to the principles governing the construction and operation of the Thomas meter, which is a distinct departure from all other types of meters, and has advantages and latitudes all its own, and yet extreme accuracy of measurement is claimed. The meter has had large adoption in America for important supplies of gas—particularly for industrial uses and on gas-works; and this experience naturally gives an amount of confidence in the claims, though unsupported by personal experience, or any extensive use in this country. But the meter is going to have greater trial and use here; and, as will be seen, a firm whose name stands for efficiency and good work have possession of the rights for the British Isles. We shall watch with considerable interest the behaviour and the commercial development in this country of a meter which does not measure on a basis of volumes by displacement, nor on a basis of velocity, and which utilizes a small amount of electrical energy in its operation. The measurements are recorded directly in cubic feet of gas, and no corrections are called for in respect of variations in pressure temperature, barometer, gravity, or composition. The meter is part of a pipe-line, and occupies little space. The panel with the registering instruments on it can be placed away in the office in a convenient position; and it gives a continuous chart of the gas flow, which helps to maintain efficiency. The principle on which the meter works is fully described in the article.

Higher Railway Rates Coming.

This is an additional burden to which all who use railways for travelling purposes or the conveyance of goods have to look forward; and we are not sure, in view of the continued movements of labour, particularly of the coal miners, that the Government have yet made a complete estimate of their requirements. The Government have resolved to discontinue subsidies, and to make the railways self-supporting; so that whatever are the extra charges that the community and industry will have to bear, it will only be to the extent that would otherwise have to be found by the taxpayers. It is estimated that from last April, the British railways, including Ireland, will show a deficiency at the rate of £54,500,000 per annum, which includes the increase of £4,400,000 in salaries and wages that came into force on the 1st inst. under the provisions of the sliding-scale. This forecast as to financial result is from information given by the Ministry of Transport to the Rates Advisory Committee, in asking them to consider and advise as to what increase should be made in rates, fares, tolls, dues, &c., so as to yield by June, 1921, the total deficit which began on April 1 last. The inquiry into the matter commenced yesterday. The cost of coal and other materials has, of course, risen for the railways as for other industrial undertakings. The railways use about 16 million tons of coal a year—about four-fifths the quantity carbonized by the gas industry. Every ton is now costing them 22s. 6d. more than before the war; while, to give another example, steel rails now cost £23, as against £6 2s. 6d. in 1914. The only hope (whether it will be realized is a question time alone can answer) is in the scheme the Ministry of Transport have drafted for the combination of the railways into groups—six for the English railways—in order to obtain greater efficiency and economy by better working and management, and the elimination of competition. The powers of the State in relation to the railways will be directed to securing the protection of the public, the economical working of the lines, and the safeguarding of the national interests. The National Union of Railwaymen, at their conference at Belfast last week, reiterated the view that not much good can come out of anything other than nationalization. How do they know?

PERSONAL.

The July issue of the Gas Light and Coke Company's "Co-Partners' Magazine" records the retirement of Mr. J. H. METHVEN, who has for two years been Resident Engineer at the Bromley Works, previous to which he was in charge at Kensal Green.

A report elsewhere in this week's issue of a presentation intimates the appointment of Mr. HARRY DUMBLETON, formerly Works Manager of the Alliance and Dublin Consumers' Gas Company, to the position of Chief Engineer, owing to the retirement of Mr. WILLIAM NEWBIGGING, M.Inst.C.E. Mr. JEREMIAH MACVEAGH, M.P. for South Down in the Nationalist interest, has been elected a Director of the Company, in place of the late Mr. J. E. Fottrell.

After sixteen years' service, Mr. A. DOUGLAS COOKE has resigned his appointment as Assistant Engineer and Manager at the Smethwick Corporation Gas Works.

Mr. CYRIL TOWERS has been appointed from among seventy applicants to the position of Engineer and Manager of the Leatherhead Gas and Lighting Company, and took up his duties at the beginning of this month. He came from Fenny Stratford, where he has been temporarily engaged during the last year or two. Immediately before that he was Engineer and Manager of the Hythe Gas Company, and before going there held a similar appointment with the Brentwood Gas Company. The position of Secretary and Manager to the Fenny Stratford Gas Light and Coke Company, Ltd., thus rendered vacant, has been filled by the appointment of Mr. JASPER COOK, who was for eighteen months Assistant Engineer to the Bedford Gas Light Company, and previously with the Herne Bay Gas and Electricity Company, Ltd.

Mr. ERNEST BURY, Works Manager of the Skinningrove Iron and Steel Works, near Middlesbrough, who, as "JOURNAL" readers are aware, has carried out experiments with coke-oven gas, and has succeeded in extracting from it ethylene, alcohol, and their derivatives on a commercial scale, has accepted an appointment in India.

OBITUARY.

The death is announced of Mr. J. W. STARKEY, aged 76 years. He was on July 1, 1883, appointed Chief Cashier of the Malta Station of the Malta and Mediterranean Gas Company; and on April 1, 1889, he was selected as Manager of the station, as well as General Manager of the other stations of the Company, from which position he retired on July 1, 1918.

Mr. JOHN L. SCALLAN, Solicitor, of Dublin, whose death occurred last week in his 77th year, had been a Director of the Alliance and Dublin Consumers' Gas Corporation for a long period, and was greatly esteemed by both Board and shareholders. He had a close, practical knowledge of the gas industry in all its branches; and his advice and guidance were highly valued.

Who's Who in Engineering.—Mr. John Ed. Sears, C.B.E., M.A., Assoc.M.Inst.C.E., has had a difficult task in compiling the first issue of "Who's Who in Engineering," which is in future to be an annual volume. An immense amount of work has been put into it; and those who in looking through the notices may happen not to see a name they are in search of will recognize that, given time and opportunity, these omissions will doubtless be made good. The aim has been to render the work of practical utility, as well as of biographical interest; and there are a number of features some of which it is hoped in future editions to make more complete than at present. For one thing, there is a classified list of engineers; and this, so far, at any rate, as gas engineers are concerned, we shall look to see gradually enlarged to far beyond its proportions on the present occasion. The Editor gives full acknowledgment of assistance rendered; but, at the same time, he makes no secret of his desire that he may, when preparing matter for subsequent editions, have in an even greater measure that co-operation which is necessary to realize his ideals. The most difficult part of the task, however, has already been accomplished in the present volume, which contains a large amount of useful information, in addition to the many biographical notices. The book is published by the Compendium Publishing Company, of Nos. 93 and 94, Chancery Lane, W.C.

MINISTRY OF HEALTH.

Transfer of Gas Powers.

DRAFT Orders in Council have been laid before Parliament, providing for the transfer of certain gas powers from the Ministry of Health to the Board of Trade, and for the transfer of certain water powers from that Department to the Ministry.

The following gas powers, not being matters essentially affecting or incidental to the health of the people, it is considered that they would more appropriately be exercised by the Board of Trade than by the Ministry of Health.

Enactment.	Powers and Duties.
The Gas and Water Works Facilities Act, 1870, and the Gas and Water Works Facilities Act, 1870, (Amendment) Act, 1873, as applied by s. 161 of the Public Health Act, 1875.	All powers and duties in relation to gas undertakings of local authorities.
The Public Health Act, 1875, s. 162.	Power to sanction the purchase by an urban authority of a gas company's undertaking.
The Gas (Standard of Calorific Power) Act, 1916.	Power to substitute a standard of calorific power, &c., in respect of gas supplied by a local authority.
The Statutory Undertakings (Temporary Increase of Charges) Act, 1918.	Power to modify statutory provisions regulating charges to be made by local authorities carrying on gas undertakings.

On the other hand, water supply is essentially a matter affecting public health. It is proposed, therefore, that all the powers and duties of the Board of Trade under the Gas and Water Works Facilities Act, 1870, and the Amending Act of 1873, in relation to water undertakings in England and Wales, shall be transferred to the Ministry of Health.

The Draft Orders have to lie before each House of Parliament for not less than thirty sitting days, and are subject to the approval of both Houses. Copies of the Draft Orders may be obtained from the Stationery Office.

ELECTRICITY SUPPLY MEMORANDA.

TARIFFS and cooking and heating were revived again at the annual meeting of the Incorporated Municipal Electrical Association. At one time these subjects were paraded annually; but during the later years of the war, not so much has been heard of them. This has not created any astonishment. Wise men in the electricity industry have realized that prices for electricity have been much too high for the industry to do anything really substantial in the heating and cooking business; and they have also known that people are not enamoured of electricity for these purposes—not only owing to the cost of current, but on account of the cost of appliances and of repairs, &c., not to speak of the time-squandering to do anything properly that there is in electrical operation. The discussion was opened by Mr. J. W. Beauchamp, who is the Director of the Electrical Development Association. He spoke of tariffs and of schemes that should be considered in order to develop the domestic load—schemes which, on some more or less arbitrary basis, exact a lump sum from consumers as well as a reduced price per unit consumed, and which seem to recall the old "Point Fives." Other members at the meeting spoke of other things; and some spoke the truth. There was Mr. F. W. Purse, of West Ham (and erstwhile of Carlisle), who looks upon the tariffs merely as beneficial to the apparatus manufacturers, without any corresponding advantage to the supply authority. The business appears to produce more worry than profit. But there are the advocates, who are more enthusiastic than philosophic, who will not allow common sense to have free play, and who prefer to regard excessive cost and the ills from which domestic electric appliances suffer as being purely imaginary. Mr. Purse said emphatically that apparatus for heating and cooking is at the present time far too expensive and unreliable. When he moved from Carlisle to West Ham, he sent three small elements from his cooker to be rewound on account of the difference in voltage. He had to wait three months for the elements, and then was charged 45s. Another point he made is that, while there is a turnover of £40,000 in the West Ham Sales Department, the amount for heating and cooking is very small indeed; and the consumers are always grumbling at failures and the cost of repairs. Delivery is shocking; and prices have gone up enormously. Electrical engineers should ponder over Mr. Purse's deliberate view that it is far more remunerative to have 1 KW. of power than 1 KW. of heating or cooking; and, in his opinion, there is not sufficient evidence at present for standardizing tariffs for domestic heating and cooking. Then we have Mr. E. E. Hoadley, of Maidstone, confessing that there were a number of houses with lighting wholly electric, but where an odd radiator or other consuming device is tacked on to the lighting circuit. This was all very well some years ago; but now radiators are 3, 4, and 6 KW. And prices! Well, the less said about them the better. Then Mr. W. A. Vignoles, of Grimsby, is credited by the "Electrical Times" with saying that if thousands of consumers came on to the mains for heating and cooking at 8d. a unit, the result might be a serious loss to the undertaking. Other frank confessions were made by speakers, to the effect that the electric cooker is not so efficient or so common in use as it was confidently expected it would become. But there were others who put forward the optimistic view that the electric cooker is coming in such a way that "gas-stoves would go." We have grown much older since we first heard those words.

Expensive and Unreliable Domestic Apparatus.

Charging Schemes and Limitations.

Of course, Mr. Vignoles was arguing (in the remark alluded to above) that there must be a lump-sum payment, and then a low running charge, which is a resuscitation of an old plan, and the only method of getting over their difficulty that the electrical people seem able to rise to. It was advocated by Mr. Beauchamp; and he revived the bases upon which lump-sums have been calculated, and introduced one or two more—omitting Mr. Trotter's old sarcastic suggestion that the charge might be based on the area of the tenant's waistcoat buttons. But the great defect of these proposals is that the bases for the lump-sum payment have no relation whatever to the uses to which electricity is put. The electricians realize this; but they can find no escape from the anomaly the only merit of which is (from their point of view) that it gives the consumer some fictitious notion that they are getting additional units at the low secondary price charged for the units of electricity actually consumed. Mr. Beauchamp says a system which secures all fixed charges entailed by the consumers' use of the supply, counts all units, needs only one meter, allows any circuit and outlet to be employed for any purpose, and drops the average cost of the units as the consumers' load factor rises, would be ideal. He marshals all the proposals that have been made in this connection; but he regards as promising a system based on size, number, and purpose of rooms, and estimated allowance in units for normal lighting. But it shows the arbitrariness of his proposal when he says that it must be based on class and type of house rather than on exact details; and, as to the estimated allowance in units for normal lighting, he asserts that this has given good results, but may raise difficulty as efficiency of lighting increases. Mr. Beauchamp develops the idea as follows: (1) A fixed charge per annum, payable in equal quarterly instalments, or otherwise, to equal the amount payable at current flat lighting rates for a portion (say, two-thirds) of the lighting consumption normal to the house; (2) in addition, all units used up to, say, 150 p.ct. of the lighting consumption normal to the house to be charged at a rate equal to (say) one-third of the usual flat lighting rate; (3) all further units used to be charged at a rate as low as it is desired to offer for additional domestic consumption. On this basis, (1) would regard the character and size of the house; (2) the number and habits of the occupants; and (3) encourage fuller electrification. An alternative method—safer in regard to fixed charges, and offering more encouragement to long-hour use—is as follows: Using one watt-hour meter for all purposes; taking into account the capacity of the electricity consuming appliances connected; making a primary fixed charge at a certain rate per kilowatt per annum on a certain percentage of the capacity represented by some of the appliances in use; and making an additional and secondary fixed charge at a different and lower rate per kilowatt per annum on certain percentages of the capacity represented by the other appliances in use.

New Conditions and Alternating Use.

All this shows the strange circumstances in which electrical undertakings are placed in trying to develop domestic electrification, and how they have come to the conclusion that they must have recourse to schemes that the non-technical consumer cannot understand, in order to make business in lines which, there is electrical authority and the practical experience of users for saying, are uneconomical and unreliable. If the industry could not develop the cooking and heating load to any material extent with the 0·5d. per unit secondary charge, they will not do it now with the charge what it must be to cover the costs of the service. And the primary charge, too, must be at figures which bear no relation to those of bygone days, but must have regard for the new order of costs for plant, fuel, repairs, renewals, &c. We sympathize with the struggle the electrical people have in the effort to develop the domestic business beyond the lighting stage, and the singular vagaries and limitations they have to indulge in to make things fit. Mr. Beauchamp advocates alternative switching to improve the load-factor; but this sort of thing does not improve the convenience nor the satisfaction or temper of electricity consumers. For instance, he suggests that washing-machines and general utility motors might be switched on alternatively with the cooker, so that they cannot both be used at once. Again if a consumer has a 5 KW. range, there can, he says, be no objection to giving him also a 5 KW. geyser, provided that it is switched on alternatively with the cooker. It is rather a hardship on the householder that the

washing-machine or the geyser cannot be used simultaneously with the cooker. But electrical need compels the inconvenience and the drawback; but it does not compel the consumer to put up with them.

Some Views. A few views from the discussion will show that the general opinion of electrical engineers is that they have no other course to take than to adopt a primary and secondary charge. In the opinion of Mr. Purse, it is a mistake to charge too little for the heating and cooking load as, from the labour-saving point of view alone, it is worth its proper price. This is true; but what is its "proper price" in relation to other fuel values? However, he thinks there is not sufficient information at present to enable a standardized tariff to be put forward for heating and cooking. Mr. Vignoles is favourable to a fixed charge and a small running charge. He is, however, convinced that people will not rush for current for heating purposes even at ½d. per unit; they must be rushed after. Mr. Wordingham's view is that the electricity industry cannot afford to make household pets of individual consumers. In framing a tariff, he holds that: (1) Nothing should be left to the judgment of the individual officer—*i.e.*, there should be a charge which can be published broadcast; (2) the charge should have some proportion to the cost of production; (3) there should be a uniform method; (4) the charge should allow for the diversity factor of individual consumers, but not for diversity between different consumers. A flat-rate, in his judgment, is wrong; and a contract price per lamp per annum is equally hopeless. In the view of Mr. Hoadley, most systems of charging for electricity for domestic use suffer from one or two defects. Either they are too complicated to appeal to consumers, or they are too unfair to appeal to engineers. Mr. Robinson, of Hackney, is of opinion that the only true method of charging for current which will adjust the price to the cost is the Hopkinson method; and he declares the impossibility of justifying the sale of current for heating in an industrial area at rates lower than the power rate. The experience of Mr. F. M. Long, of Norwich, is that the rateable value system is satisfactory. The system can be attacked in many ways as being unscientific. But it is necessary to look at these matters from a broad point of view. He thinks the lighting charge could be made high enough to cover all the charges on the station. Heating and cooking do not much affect his peak-load. The plans and the discussion were all very crude. Later on at a general meeting, a resolution was passed instructing the Council to consider the question of developing the sale of electricity for domestic purposes, and especially (*a*) tariffs, and (*b*) the use of electricity for heating, cooking, and other domestic purposes.

Electric Heating in the City. The City of London is different from all other places. It is a conglomeration of business premises and offices; and the population during the day and that during the night are as wide apart as the poles. Thus it is that temporary intermittent daytime heating is all that is required during the winter months; and the conditions there favour electricity more than they would do in any other area. Mr. A. F. Harrison calls attention to the progress in the electric heating load in an article in "The Electrician;" but the figures he gives do not astonish us. In 1903, the aggregate capacity of radiators connected to the City of London Electric Lighting Company's mains was 600 KW. By 1908, it had increased to 2000 KW.; in 1914, it was 5000 KW.; and at the present time, it is 11,400 KW. The growing use of electric heating means at the present time an addition of at least 10,000 KW. to the normal load on the Bankside Station on a frosty morning. On Easter Tuesday an unexpected fog coincided with an equally unexpected frost; and between 9 and 10 a.m., the load reached a peak of 23,000 KW. Mr. Harrison refers to this as "no mean performance." If he writes thus of the Bankside Station, it may be taken that a like condition would have meant disaster for a station not so well circumstanced. To have something nearly approaching maximum lighting and maximum heating coinciding, with heating in similar proportions to the demand in the City of London for the intermittent use of offices and business premises, would not be welcomed by many electrical engineers. The Charing Cross Company's city undertaking has connected to its mains radiators with an aggregate capacity of 4000 KW.; and in 1919 it sold 2 million units for heating purposes, which, with the 5 million units sold by the City of London Company, makes 7 millions for the year. Yet walking through City offices, no one would jump to such an absurd conclusion that electric heating is anything like universal—in fact, Mr. Harrison himself says: "Roughly it may be computed that 10,000 radiators (allowing an average of 1500 watts per radiator) are in use within the one square mile; but the total possible demand must be fully thirty times the number." The 10,000 radiators are a small proportion of the total number of rooms in the City area.

Heating Load and Load Factor. Mr. Harrison discusses the heating load and load factor. What he says is most instructive. The individual load factor is very poor. Diversity is almost non-existent; and regarded by itself the heating load has little to commend it to the supply company. All that can be said is that it is confined to a certain season of the year; and during that period it occupies during daylight hours plant which is required each evening to meet the lighting peak. This would not apply to residential areas, where in the winter, if electricity was largely used for heating, the demand would synchronize with the peak of the lighting load. Up to the present, says Mr. Harrison, supply undertakings have not had to deal with heating upon a large scale. It has been regarded as an adjunct to the main purposes for which electricity is used; and much has been assumed in regard to its value and profit-earning possibilities. Whether, at the reduced price usually charged, it is or is not a paying business for electric supply undertakings is a question that is likely before long to call for a definite decision. Mr. Harrison is both optimistic and pessimistic. Drawing conclusions from the parallel of the gas industry, a heating demand, he remarks, may apparently be anticipated in the not far-distant future exceeding that for all other purposes combined; and it is open to question whether the loss of load factor which will inevitably ensue will be sufficiently compensated by the increased sale. The difficulty will be the capital cost of distribution. In suburban or country districts, this may easily prove prohibitive, and compel a tariff designed for the purpose of discouraging consumers from using electric heating. In town areas density may be attained, and the main difficulty will not be so great; but there is danger that popularity may cause trouble at the generating station where the unanimity of demand in cold weather may prove disconcerting. It cannot be said that these difficulties have yet been acute; but if the present acceleration in heating demand becomes an established enthusiasm on the part of electricity consumers, they will quickly become apparent. So far as the City district is concerned, the load factor on the whole output within the district is already very poor (about 16 p.ct. only) with little or no prospect of improvement; and the addition of a large heating load cannot have such a destroying effect as it may have in industrial areas. A reduction from 16 to (say) 12 p.ct. would cover a very large addition in heating, and would not, Mr. Harrison says, make much difference to the cost of production. Elsewhere, however, the drop might be from 25 or 30 to 15 p.ct. with uncomfortable, if not disastrous, results.

Factor of Safety in Gasholders.

In "De Ingenieur" for May 1 an article appeared by Herr A. G. Baumhauer, giving the details of some careful experiments carried out in a Dutch aerodynamic laboratory which prove that the stresses set up in gasholders during a gale differ materially from those generally thought to occur, and on which official rules for the design of gasholders have hitherto been based. For the following abstract of the article we are indebted to the "Technical Review" of the 6th inst.: Professor Prandtl used a model about 2 ft. 6 in. high, mounted on a flat plate, and placed in a current of air to which any desired velocity—from 6 ft. 6 in. to 65 ft. 6 in. per second—could be imparted. A number of small holes were drilled on the front centre-line of the model, and all were plugged in turn except one. The interior space was connected to micro-differential pressure gauge through a hollow axis, in such a manner that the pressure at the unplugged hole was recorded on the gauge. The opposite side of the gauge was connected to an opening in the wall, and did not register dynamic pressure but solely the static pressure of the air-current. The difference shown by the gauge was consequently the resultant pressure at the point of the unplugged hole. The readings obtained in this manner, when plotted, clearly demonstrated the distribution of pressure and the points at which oscillations may occur. It was found that the horizontal component of the air pressure may be expressed as follows: $Rx = 0{\cdot}782 \times p_s \times O_c$, where p_s = the mean static pressure of the air, and O_c = the projected surface of the gasholder—viz., the mean diameter multiplied by the mean height. The result is considerably higher than that which forms the basis for the standard government relations issued for Prussia. These are obtained from the formula: $Rx = 0{\cdot}67 \times p_s \times O_c$, and the deficiency usually amounts to 17 p.ct. when compared with the above-mentioned formula.

National Association of Technical Gas Officials.—A members' meeting for the North British District of the above Association was held last Wednesday afternoon, at the Central Station Hotel, Glasgow. A fairly representative gathering assembled; and, after an interesting discussion, they elected their Committee for the ensuing year.

Distribution by Steel.—An early opportunity will be taken of noticing more fully a copy just received from Messrs. Benn Bros., Ltd., of the second edition of "Distribution by Steel (Gas and Water)," with high-pressure tables for the flow of gas in mains, by Messrs. Henry Woodall, M.Inst.C.E., and B. R. Parkinson, M.Inst.Mech.E. The book contains 90 illustrations; and the price of it is 15s. net.

Temporary Increase of Charges Act.—Orders have been made under the Statutory Undertakings (Temporary Increase of Charges) Act, by the Ministry of Health, authorizing the Biddulph Urban District Council to increase the maximum price charged by them for gas from 5s. 6d. to 6s. 6d. per 1000 c.ft.; the Birmingham Corporation, from 4s. to 5s. per 1000 c.ft.; the Carnarvon Corporation, from 5s. to 6s. per 1000 c.ft. and the Oldham Corporation, from 4s. 6d. to 6s. per 1000 c.ft. Applications for Orders have been received by the Ministry from the Mountain Ash and the Portmadoc Urban District Councils.

THE THOMAS GAS-METER.

A Meter which Needs no Correction for Variations in Pressure, Temperature, Barometer, Gravity, or Composition.

We have from time to time published references to the Thomas meter—chiefly from American contemporaries; but now this country is going to be brought into closer relationship with it, seeing that Messrs. Humphreys and Glasgow have undertaken the exploitation of it in the United Kingdom. This will increase the interest of British gas engineers in the matter; for they know that the firm in question would be the last to enter into business in a new direction unless they were satisfied that they could do so upon merit.

The Thomas meter stands absolutely alone. It is a measurer of gas, in any volume or at any pressure, that is radically different in principle and construction from all its predecessors. It lays claim to advantages which no other meter can claim, in that measurements are shown in cubic feet, and need not be corrected for variations in pressure, temperature, barometer, gravity, or composition of the gas. It not only measures the gases, and automatically corrects itself according to changes in physical conditions, but it provides continuously a permanent graphic record showing the rate of flow of gas in cubic feet. These, tersely put, are the claims.

The Genesis of the Meter.

The inventor of the meter is Professor Thomas, formerly of Cornell University, later Professor of Steam Engineering at the University of Wisconsin, and now head of Mechanical Engineering at Johns Hopkins University, Baltimore. It was while he was engaged upon some experimental work on a steam calorimeter at Wisconsin—using an electric heater to raise the temperature of steam, and then condensing it—that the inspiration came which led to the development of the meter. He wondered if the same system could not be applied to volumetric measurement as well as to heat measurement; and he proceeded to conduct quite a long research into the matter on commercial gases—such as coal gas, water gas, and coke-oven gas. He found that for any definite type of gas the specific heat of a cubic foot was practically constant from day to day. The next step was the patenting of the principle; and this was followed by transferring the invention, for working-out the details, and making the meter entirely automatic in measuring practically any kind of gas, and for commercial development in America, to the Cutler-Hammer Manufacturing Company, of Milwaukee, who are reputed to be the largest manufacturers in the world of electrical controlling devices. The Company worked on the meter for some years, until ultimately they developed it into a perfectly dependable instrument for the purpose.

The Principle of the Thomas Meter.

The principle of the meter is based on the specific heat of a standard cubic foot of gas—in other words, the heat required to heat 1 c.ft. 1° Fahr., when the cubic foot is at the standard conditions of 30 in. bar. and 60° Fahr. As we have already said, the meter has made possible the measurement of gases directly in the units in which they are bought or sold or compared, with no corrections for pressure, temperature, &c. Here one has the reason for the existence of the meter, because no other meter does this; and so here we are offered something (assuming that trial in this country confirms reliability) that goes beyond anything that has been previously applied to the measurement of gas. It is an advance—an application of science to practical purposes; and until the last few years we have had little enough of science brought to bear upon the affairs of the gas industry. However, direct measurement is effected by warming the gas just 2° as it flows through the meter, and measuring accurately the quantity of heat required to do this. Now Prof. Thomas's researches showed him that, employing a standard cubic-foot vessel filled with gas at standard conditions, he had a definite mass there, and that to raise its temperature by 2° (or, in fact, that of any of the constituents of an industrial gas) took a definite amount of heat. It does not matter in the slightest if the cubic foot of gas is compressed to increase the pressure, the mass remains the same; and it takes exactly the same amount of heat to raise the temperature 2°. Or one may expand the gas and increase the temperature, so varying the volume of the mass; but the amount of heat required to raise the temperature 2° remains practically constant. The value of this will be appreciated in connection with the measurement of high-pressure gas. Therefore, no correction is needed for temperature or pressure changes; and automatic correction is also made for the water vapour in the gas at different temperatures. Thus it simply comes to this: If just enough heat is introduced into a flowing stream of gas to warm it 2°, a measure of the quantity of heat absorbed by the gas constitutes a measure of the gas in cubic feet.

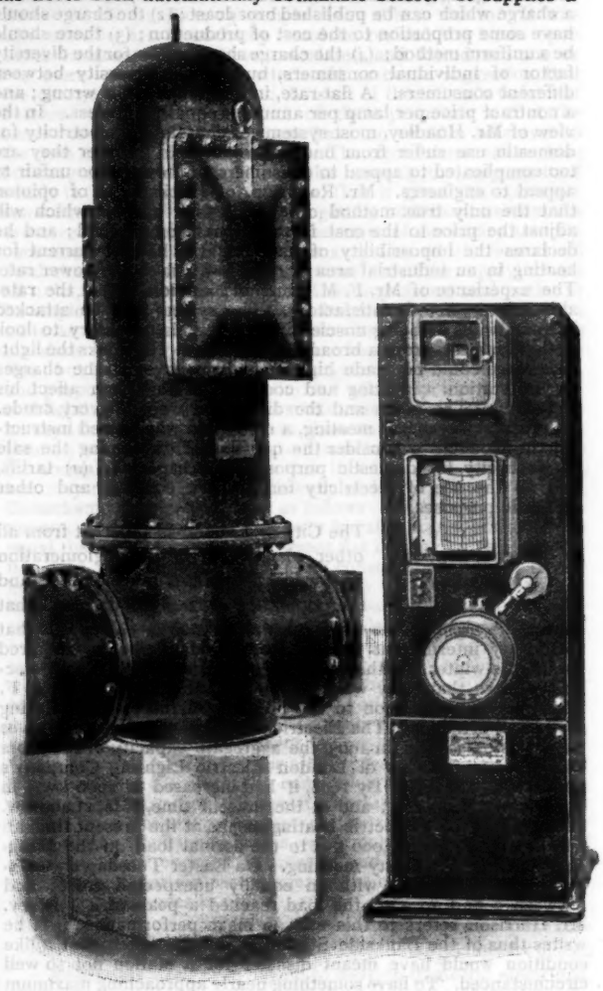
Electrical Energy.

Electrical energy is used to warm the gas, because it can be easily controlled, and very accurately measured. The meter can be designed either for an alternating or a direct current, or for (say) 110 volts or 220 volts. We are informed that only 12 watt-hours (0·012 unit) are needed per 1000 c.ft., or 1·2 units, per 100,000 c.ft. This is remarkably small. The calorific value of the 1·2 units is only 4098 B.Th.U. Therefore, whether the meters be large or small, the cost of the heat energy per 1000 c.ft. is quite low.

Essential Parts of the Thomas Meter—A Continuous Record.

As to the essential parts of the meter, there are not a great number. There is first the heater, through which the electric current flows to warm the gas. Secondly, there are the electrical resistance grids, which are called the electrical thermometers—one at the entrance, and the other at the exit side of the heater—to indicate the temperature rise of the gas. Thirdly, there is the current regulator, the function of which is to vary the heater current, so that with the variations in gas flow, there is always enough current to warm the gas 2°. Fourthly, there is the watt-meter to measure the electrical energy consumed in warming the gas 2°.

The results are given in two forms—one on an integrating meter, with dials similar to any other ordinary meter. The other record of the gas is given on a chart, showing the rate in cubic feet per hour at any instant of the day or night. This is a vital and valuable part of the meter. It gives something which has never been automatically obtainable before. It supplies a



The Meter on the Pipe-Line, and the Panel showing the Registering Instruments.

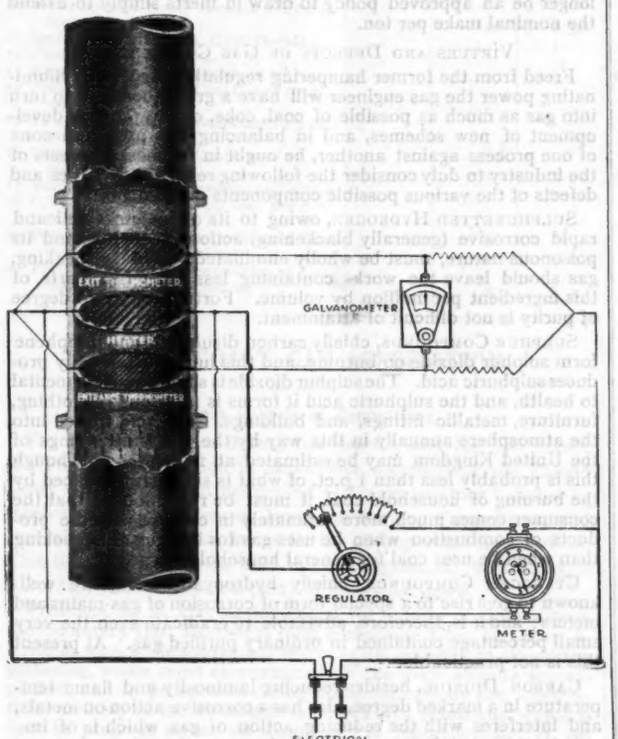
chart telling exactly what has happened in the volume-flow of gas at any period of the day or night. It is in continuous records that we are in future going to maintain better supervision in the gas industry.

Measurement of High-Pressure Gas—A Maximum Demand System of Charging.

In this country the question of the measurement of high-pressure gas has been a problem upon which inventors and manufacturers have been diligently at work. As yet, however, no meter for the measurement of gas distributed at high pressures has been accepted, certified, and stamped by the authorities. The Thomas meter claims to have solved the problem by a departure from the old volumetric method—calling in the aid of physical means. A wide variation in pressures, it is declared, makes no difference. We look to America for confirmation. In the United States, quite a number of the meters are in use on high-pressure distribution systems, where large quantities of gas are consumed by industrial plants. In the City of Toledo (Ohio), there are eight Thomas meters installed on the distribution system for surplus coke-oven gas, which is purchased for domestic use

from the coking plant of the Toledo Furnace Company. The same system of distributing mains is used as in the days of the supply from the ordinary gas plant. Incidentally it may be mentioned that the Toledo meters are made in sizes according to requirements; the smallest being 300,000 c.ft. per hour, and the largest 500,000 c.ft.

To show the variety of purposes for which the meter measures gas, it may be mentioned that Willy's Overland Automobile Company have two of the meters installed for registering the gas they use in large quantity in their heating processes. The Mather Spring Company use the meter for measuring the large consumption of gas required in making automobile springs. The meter is employed for measuring the immense consumption of gas in the big glass-melting furnaces of the Libby Glass Company. The Toledo Railway and Light Company use the meter for measuring the total gas used under their boilers. The meter is also being employed on natural gas systems, with variations of pressure ranging from 5 lbs. to about 60 lbs. per square inch. All these meters, we are informed, automatically give results correct to standard cubic feet. The Carnegie Steel Company of Clairton have the largest gas-measuring plant upon this system, being equal to 9 million c.ft. per hour, and dealing with the gas from 640 coke-ovens. The Peoples Gas Company of Chicago have recently put on order four meters—two for a new coke-oven plant, and two for water-gas measurement. These are only a few samples of installations in the United States, ranging between the year 1911 and the present time; so that experience has been considerable.



A Galvanometer connected in a Wheatstone Bridge Circuit with the Thermometers, so that Variations in their Relative Resistance Deflect a Needle to the Right or Left.

An interesting point transpires in this connection. In Toledo, there is, in addition to the flat-rate per 1000 c.ft. of gas, a maximum demand charge based on the maximum hourly consumption of gas in any one month. This maximum hourly demand is obtained directly and instantaneously from an inspection of the meter-charts. Previous to putting in the Thomas meters, a quite laborious and uncertain test had to be applied for determining the maximum demand. They never knew when the maximum demand would come on. Sometimes several days were spent, when it was expected that the maximum hour would arrive, in the reading of a number of dry meters in parallel.

SIZES AND SPACE OCCUPIED.

It may be of interest to mention that the smallest meter has a capacity of 25,000 c.ft. per hour, and registers down to 2500 c.ft. The largest size has a capacity of some 1,500,000 c.ft. per hour.

The meters occupy very little space, which is a great consideration in many works and factories. The meter itself fits right into the pipe-line, the same as a flange-pipe fitting; and the panel carrying the registering instruments may be placed at practically any distance away from the meter, where the records are the most accessible and useful—for instance, in the office of the engineer and manager, or anywhere else—the meter itself being away on the pipe-line, as shown by the illustration. Very little floor-space is taken up compared with the ordinary meter.

WEAR AND TEAR.

There are no moving parts in the meter in contact with the gas; and the heater is nickel chromium wire, which is practically unaffected by acids. The nickel wire in the thermometer is drawn through a small brass tube, which has a heavy lead sheath over it, so they are protected by the lead from any corrosive action.

IN THIS COUNTRY.

As we have indicated, Messrs. Humphreys and Glasgow have taken over the rights in the Thomas meter for the British Isles, and propose manufacturing them in this country, where installations are now being made. At present, however, the meters are coming from America.

Liverpool was the first gas-works to have the meter installed. Prof. Thomas put one of the early types in there in 1912. Some trouble was experienced with it—probably due to detail design defects, which were later surmounted by the aid of experience here and in the States. The old meter was replaced last year by a new type; and it has been running continuously since it started operating last September. There are three more on the way over here—one for the Gas Light Company, one for the Brentford Gas Company, and one for the Plymouth Company. We expect before long to hear of further developments in adoption, the rate of which will be accelerated by good experience here supplementing that which has already liberally accrued in the States.

Power in Coal Tar.

An Exchange telegram from Berlin last week said that technical journals published there describe the great success which has been attained in the use of raw coal-tar instead of tar-oil for driving Diesel motors. When cleansed by filtering, and raised to a temperature of 60° C. before use, the tar gives perfectly good results. The electricity works at Meiningen also report the direct use of tar as power oil; the tar there being produced in horizontal retorts, as it contains a larger proportion of carbon. At Meiningen the tar is first purified by heating, and allowed to stand until the solid impurities settle-out. It is then filtered. Ignition is effected with paraffin or distilled petroleum.

A Gas Efficiency and Economy Inquiry.

At last year's meeting of the Pacific Coast Gas Association, it was decided to appoint a "B.Th.U. Content Committee," to investigate the proper quality of gas to be produced for domestic distribution. But as the object was deemed of vital importance to the industry, it was thought best, before the Committee took any action, to consult with the Gas Engineering Department of the Railroad Commission of the State of California. The result was the organization by the Commission of a body to be known as the Joint Committee on Efficiency and Economy of Gas. This Committee is representative of the Railroad Commission, the public utility corporations engaged in the manufacture and sale of gas in California, and the Pacific Coast Gas Association. The men on it include the foremost gas engineers of California. It is the purpose of this body to make a thorough investigation on the subject of the efficiency and economy of gas production, transmission, distribution, and utilization. Gas in California and on the Pacific Coast is made exclusively from crude oil or its distillates; and so the value of the results of the investigation on production will be limited to that part. As, however, the gas produced by this method is in all respects comparable with domestic gas made by other means, the inquiry with regard to distribution and utilization will obviously be of value to the industry as a whole. The cost of the work will, of course, be substantial; and the public utility corporations engaged in the sale of gas in the State will contribute towards it a percentage of their gross revenue. It is thought that perhaps two years may be occupied, with a cost of some $25,000 per annum. Sub-Committees have been appointed; and two gas-works have been placed at the disposal of the Committee—the San José works of the Pacific Gas and Electric Company, with an output of 30 million cubic feet of gas per month, serving 10,000 consumers; and the Santa Barbara works of the Southern Counties Gas Company, with an output of about 20 million cubic feet of gas a month, and 6000 consumers. Oil gas by different processes is produced at the two works; while distribution in one case is exclusively at low pressure, and in the other low pressure and high pressure combined.

The Late Sir Corbet Woodall.—The statue to Sir Corbet Woodall which has been erected at the Beckton Works of the Gas Light and Coke Company will be unveiled next Monday.

Corn-Cobs Used in Gas Making.—The City of Omaha (Neb.) has just taken over a gas-plant, at a cost of $4,800,000, in connection with the manufacturing operations in which corn-cobs are used. The gas made by the Omaha Gas Company is enriched water gas; coke, steam, and gas oil being the ingredients, mixed according to formula. After the gas has thus been made, it is put through a purifier-house, where wet corn-cobs covered with iron ore take up the impurities. There is a series of pits in which the gas goes through this purifying process before distribution. At intervals these pits are cleaned-out, and the used corn-cobs are replaced by a fresh supply.

TOWN GAS.

By W. B. Davidson, Ph.D., D.Sc.

(*Concluded from p. 24.*)

Research of Seven Years Since.

In connection with the Gas Investigation Committee's admirable researches (recently published) on the effect of inerts, no reference is made to the writer's previous work on the subject; and he therefore quotes from his paper on "Liquid Purification" [see "Journal" for June, 1913].

Flame temperature, and consequently incandescent lighting, and general furnace-work are improved by the removal of carbonic acid. If carbonic acid be added to a sample of gas, the efficiency of illumination per cubic foot of gas will be reduced by a much larger amount than the percentage added. The author has made the following tests, which throw some light on the subject. The results similarly obtained with nitrogen are given for the sake of comparison.

I.—*Flame Temperatures taken with Platinum-Platinum-Rhodium Thermo-Couple in the Centre of a Méker Burner Coal-Gas Flame at a Definite Point near the Base.*

		Reduction.
(1) Coal gas only	1210° C.	
,, ,, + 5 p.ct. CO_2	1180° ,,	30°
,, ,, + 10 ,, CO_2	1155° ,,	25°
		Reduction.
(2) Coal gas only	1280° C.	
,, ,, + 5 p.ct. N	1255° ,,	25°
,, ,, + 10 ,, N	1235° ,,	20°

II.—*Maximum Temperature Taken.*

		Reduction.
(1) Coal gas only	1320° C.	
,, ,, + 5 p.ct. CO_2	1300° ,,	20°
,, ,, + 10 ,, CO_2	1280° ,,	20°
		Reduction.
(2) Coal gas only	1300° C.	
,, ,, + 5 p.ct. N	1285° ,,	15°
,, ,, + 10 ,, N	1270° ,,	15°

It was difficult to obtain a very accurate reading of temperature; but the difference between the effect of carbonic acid and that of nitrogen was very distinct.

III.—*The Effect on Incandescent Lighting Compared upon a Welsbach "C" Burner—Maximum Efficiency being Obtained in Each Case.*

	Candle Power at a Consumption of 5 C.Ft. per Hour, Corrected.	Reduction per Cent.
(1) Coal gas only	103·8	
,, ,, + 5 p.ct. CO_2	93·7	9·7
,, ,, + 10 ,, CO_2	85·4	17·7
(2) Coal gas only	96·5	
,, ,, + 5 p.ct. N	90 2	6·5
,, ,, + 10 ,, N	84·4	12·5

These results are to be anticipated when the specific heats of the products of combustion are compared. These increase rapidly with the temperature—the specific heat of carbon dioxide being higher than that of steam, and very much higher than that of nitrogen.

Comparing the above results with those that were obtained by Mr. J. W. Wood, we get:

Calculated for Constant Number of Heat Units Supplied.

	Wood.	Davidson.
Percentage drop in candle power for each 1 p.ct. of nitrogen added	0·4 to 0·6	0·3
Percentage drop in candle power for each 1 p.ct. of CO_2 added	1·2	0·9

The writer only went so far as to add 10 p.ct. of nitrogen or CO_2 to ordinary coal gas containing about 12 p.ct. of inerts; and his average decreases in candle power would probably have been higher if he had gone further. But he did not in any of his tests obtain the very remarkable results of Mr. Wood—namely, that the first additions of nitrogen to a good coal gas effected no reduction in the candle power produced per thermal unit.

Tests carried out with incandescent mantles and burners do not permit of great accuracy. There are too many variable factors. Probably the best method is to select for each gas mixture the best upright burner and the most suitable shape of mantle, while adhering to the same kind and quality of mantle; and then make the necessary adjustments of pressure (within limits), of injector nipple and air-ports, so as to obtain the maximum possible efficiency. This would, of course, involve a great deal of experimenting; but it would most probably eliminate puzzling anomalies in the results.

One can hardly conceive of any reason why gas mixtures of the kind dealt with, the flame temperatures of which are undoubtedly reduced by the addition of inert nitrogen and carbon dioxide, should not in every case, under fair conditions of testing, suffer a reduction in candle power by the admixture of these gases, although the quantity of heat units supplied is kept constant.

No one who has had any experience in the large-scale manufacture of coal gas would wish to see stringent regulations for the limitation of inert gases. The writer's experience indicates that whereas on a small works, carefully kept, the figure for nitrogen content need not exceed 10 p.ct., on the other hand on a large works—especially where there is more than one system of retorts—it is a matter of great difficulty to keep below 12 p.ct. without losing gas from the retorts or spending an excessive amount on retort maintenance.

Manufacturing Uneconomy of Unnecessary Inerts.

Some gas engineers would fain be free from every kind of restriction in the quality and composition of the gas they supply. One sometimes hears the exclamation, "Electricity does not labour under any testing restrictions, so why should gas?" This is, of course, a foolish position to take up, as it ignores all the fundamental differences between gas and electricity. The proper view to take, the writer believes, is this: Low-grade gas, made by overpulling or excessive steaming, is not so useful in serving the varied interests of the community as gas of ordinary good quality. Per thermal unit it costs more to condense, more to wash, more to purify, more to store, and more to distribute. In the recovery of bye-products—such as ammonia, cyanogen, and benzol—the losses in extraction will be greater; and there will be greater tendency to naphthalene trouble. But as an offset to all these disadvantages, possible large reductions in manufacturing costs must be considered—reductions which will compensate supplier and consumer alike for deficiency in quality. It may, indeed, be said that steaming is undoubtedly a paying proposition, particularly when the necessary steam is generated by the waste heat of the retort-house. But, under the new prospective conditions of selling heat units and not merely cubic feet, it will obviously no longer be an approved policy to draw in inerts simply to extend the nominal make per ton.

Virtues and Defects of Gas Components.

Freed from the former hampering regulations regarding illuminating power the gas engineer will have a great incentive to turn into gas as much as possible of coal, coke, or tar. In the development of new schemes, and in balancing the pros and cons of one process against another, he ought in the best interests of the industry to duly consider the following recognized virtues and defects of the various possible components of town gas.

Sulphuretted Hydrogen, owing to its obnoxious smell and rapid corrosive (generally blackening) action on metals, and its poisonous nature, must be wholly eliminated. Strictly speaking, gas should leave the works containing less than two parts of this ingredient per million by volume. Fortunately, this degree of purity is not difficult of attainment.

Sulphur Compounds, chiefly carbon disulphide and thiophene form sulphur dioxide on burning, and this in turn eventually produces sulphuric acid. The sulphur dioxide is somewhat detrimental to health, and the sulphuric acid it forms is injurious to clothing, furniture, metallic fittings, and buildings. The acid turned into the atmosphere annually in this way by the gas undertakings of the United Kingdom may be estimated at 10,000 tons. Though this is probably less than 1 p.ct. of what is similarly produced by the burning of household coal, it must be remembered that the consumer comes much more intimately in contact with the products of combustion when he uses gas for lighting and cooking than when he uses coal for general household purposes.

Cyanogen Compounds, chiefly hydrocyanic acid, are well-known to give rise to a special form of corrosion of gas-mains and meters; and it is, therefore, advisable to eradicate even the very small percentage contained in ordinary purified gas. At present this is not practicable.

Carbon Dioxide, besides reducing luminosity and flame temperature in a marked degree, also has a corrosive action on metals, and interferes with the reducing action of gas, which is of importance in certain processes. It is more than three times as heavy as coal gas.

Oxygen exercises a corrosive action on iron and other metals especially in the presence of carbon dioxide. The small amount usually present has, however, only a negligible influence.

Nitrogen is a diluent with no disadvantages except that, as previously noted, it lowers the flame temperature and interferes with the use of town gas for high-temperature work. Being at least twice as dense as coal gas, it tends to raise the specific gravity of a mixture, and (like CO_2) thereby retards the discharge through pipes.

[The last-named three gases have absolutely no heating value. They are not combustible in the ordinary sense of the term, but are inerts or diluents better kept out of the ideal town gas.]

Carbon Monoxide is well-known as a powerful poison. To it, are due the toxic properties of coal gas, and especially water gas; and many are the attempts that have been made, and patented processes brought out, with the object of eliminating this ingredient from illuminating gas. Probably, it will always persist in considerable volumes in the gas made by different processes and be regarded as a necessary evil. One thing in favour of its retention is its comparatively high flame temperature.

Ethylene and Benzene. These and other unsaturated hydrocarbons are useful in concentrating high calorific value into small bulk, and in imparting luminosity to the flame.

Methane. The larger proportion of the heat units in town gas is usually due to this constituent; and though it has a con-

siderably lower flame temperature than either carbon monoxide or hydrogen, its presence is very desirable. But it would be going too far to stipulate a minimum percentage, as suggested.

HYDROGEN. The chief disadvantage of hydrogen is its low ignition point, which causes it to be very susceptible to preignition in gas-engines and to accidental explosions in the retort-house during the "shut-down" period.

NAPHTHALENE. The presence of naphthalene is such a bugbear to both consumer and supplier that the wonder is that gas engineers do not more generally take proper steps to eradicate the evil of stoppages in the services by adopting simple expedients on the works.

CONCLUSION.

It should perhaps be pointed-out, in conclusion, that an undertaking supplying town gas ought not only to maintain a suitable and uniform service pressure, but also an equable quality. It must be remembered that it is the actual calorific value that the consumer gets, and will have to pay for—not necessarily the value corrected to 30 in. barometer. Under ideal conditions of supply, the gas engineer will endeavour to improve the quality when the barometer is very low, and *vice versâ*. There may be a variation of as much as 30 B.Th.U. in the actual (uncorrected) calorific value, due to barometric pressure alone.

The following table of data will probably be found useful:

PRINCIPAL PROPERTIES OF THE COMPONENTS OF TOWN GAS.

1 Name 2 Formula	Air.	Carbon Dioxide. CO_2.	Oxygen. O_2.	Carbon Monoxide. CO.	Ethylene. C_2H_4.	Benzene. C_6H_6.	Methane. CH_4.	Hydrogen. H_2.	Nitrogen. N_2.	Aqueous Vapour. H_2O.
3 Specific gravity (Air = 1) dry	(Dry and free CO_2) 1	1·5290	1·1055	0·9674	0·985	2·694	0·555	0·06952	0·9674	0·6212
4 Grams per litre, 0° C. and 760 mm., dry	1·2928	1·9768	1·4291	1·2505	1·274	3·482	0·717	0·08987	1·2507	(0·8031)
5 Lbs. per 1000 c.ft., 60° F. and 30", dry	76·54	117·01	84 61	74·04	75·43	206·2	42·45	5·321	74·05	(47·55)
6 Lbs. per 1000 c.ft., 60° F. and 30", moist	76·04	115·81	83 98	73·58	74·95	203·5	42·54	6·050	73 59	..
7 B.Th.U. per c.ft., 60° F. and 30", moist, Gross	*Nil*	*Nil*	*Nil*	320	1580	3650	998	321	*Nil*	*Nil*
8 B.Th.U. per c.ft., 60° F. and 30", moist, Net	*Nil*	*Nil*	*Nil*	320	1475	3500	897	269	*Nil*	*Nil*
9 Mean Specific Heat, Calories per cubic metre, 0°—200° C.	0·310	0·413	0·310	0·310	..	..	0·310	0·310	0·310	0·386
10 Mean Specific Heat, Calories per cubic metre, 0°—2000° C.	0·358	0·710	0·358	0·358	..	..	0·358	0·358	0·358	0·619
11 Ignition Temperature, C (M'David).	..	..	..	931	1000	..	> 1000	747	..	..
12 Flame Temperature, C.	..	..	..	2100	..	..	1830	1960	..	..
13 Explosive Limits, per cent. in air	..	..	..	16·6—74·8	4·2—14·5	2·7—6·3	6·2—12·7	9·5—66·3	..	..
14 Percentage Effect on Coal Gas of 1 p.ct., on C.V.	−1	−1	−1	−0·4	+1·8	+6·0	+0·8	−0·5	−1	−1
15 Percentage Effect on Coal Gas of 1 p.ct., on I.P. (Argand)	−2·7	−3·5	−3·0	−0·9	+10·9	+18·0	−0·4	−0·5	−2·6	?
16 Percentage Effect on Coal Gas of 1 p.ct., on I.P. (Incand.)	..	−2·2	..	..	..	..	..	..	−1·4	?
17 Volumes of air for complete combustion	..	..	..	2·38	14·29	35·7	9·52	2·38	..	..
18 C.V. of mixture, B.Th.U. net per c.ft., 60° and 30", moist	..	..	..	94 7	96·5	95·3	85·2	79·6	..	..
19 Probable Average Composition of Coal Gas, 1900 (Lime Purified)	..	0·7	0·5	7	3·5	1	35	44	7	1·3
20 Probable Average Composition of Coal Gas, 1920 (Oxide Purified)	..	2·7	1	8	2	1	25	45	14	1·3

PACIFIC COAST GAS ASSOCIATION.

Progress Reports of Committees.

For the second time during this season, and the last before the Portland convention in September, members of the Pacific Coast Gas Association assembled at a "get-together" dinner to receive reports of progress from the various Committees, and generally to line-up their forces for the all-important annual event. This time the dinner was held in Los Angeles, on the evening of Saturday, June 12, when a party of ninety sat down.

President A. B. Day having called for reports of Committees, the Secretary (Mr. Bostwick) read a message from Mr. John A. Britton, who, while expressing regret at his inability to attend the gathering, wrote most encouragingly of the work already accomplished, and in prospect of being accomplished, by the Association—notably in the investigation of B.Th.U. standards, which is now in progress under its auspices. A report by Mr. H. M. Crawford for the Committee on the Piping of Buildings for Gas was read by the Secretary. Mr. E. S. Bryant, formerly of the California State Railroad Commission, and now Field Engineer in the employ of the Joint Committee on Efficiency and Economy of Gas, reported progress for the Committee, some particulars with regard to which are given on another page. He stated that since the last gathering in February the time had been taken up with preparations for the B.Th.U. standard tests to be conducted at the agreed-upon points; but the preliminaries were now completed, and the tests would begin without delay. It is matter of common knowledge that the California State Railroad Commission have, for the present, fixed the standard of gas to be manufactured and distributed to consumers at 570 B.Th.U., but have expressed themselves as being perfectly willing to be convinced on this important subject. The question to be decided, of course, is whether or not a lower standard makes for better all-round efficiency. The reports of tests recently made in Great Britain would seem to point to the affirmative. Mr. A. B. Macbeth (President of the Southern California Gas Company) spoke upon the ever-present problem of the peak load in gas distribution. He warned his hearers of the constantly increasing demand, and of the rapidly approaching day when, unless they bent their shoulders to the wheel, the manufacturing and distributing companies would be unable to meet this demand. Mr. F. S. Wade (of the Southern Counties Gas Company) related his experience in a recent trip East, and gave some interesting information concerning a widespread campaign of publicity undertaken in New York for the purpose of acquainting the public with the absolute necessity of gas for domestic uses.

THE MANGNALL-IRVING BORER.

In the course of the discussion at last Wednesday's Eastern District meeting of the British Commercial Gas Association, Mr. Arthur E. Collins, the City Engineer of Norwich, made reference to an experiment that is being carried out there in connection with drain-pipe laying operations, and which he suggested might in some circumstances be applicable to the work of gas undertakings. What he alluded to was the Mangnall-Irving hydraulic earth thrust-borer, made by the Hydraulic Engineering Company, of Chester, in using which, as he explained, holes are made in the ground at convenient distances apart (which may be as much as 150 ft.), and these are afterwards linked together by thrust-borings of the required size. This size may be from 3 to 12 in. in diameter, and even larger under certain conditions. The earth is compressed and displaced around the thrust-boring tool, or "pilot;" there being no cutting action, and consequently no spoil. By virtue of this compression around the thrust-bore, the internal skin is hardened sufficiently to permit the feeding along its surface of heavy cables or pipes, without causing any material scouring of the bore. Of course, the nature of the ground most suitable for thrust-boring is where the earth is consolidated, and clay exists in some proportion.

The thrust-borer is placed in one pit, and supplied with power by a petrol-driven high-pressure hydraulic pump set, through flexible connections. By this means, the "pilot" is first driven forward horizontally into the ground, at the level desired; the "gun" having previously been accurately aligned on the next pit by suitable gear. The "pilot" is then thrust ahead by the addition in quick succession of a series of thrust-bore tubes, until the "pilot" breaks through into the next pit. The thrust-borer then withdraws the tubes from the bore; and they are uncoupled one by one. The overall working speed from start to finish of a thrust-boring 4 in. diameter is said to be 150 ft. in thirty minutes, with a working team of three men. Allowing for time spent in extracting tubes, cleaning, and moving the gear from pit to pit, at least two thrust-borings can be made in an eight-hour working day. Pipes are either pulled or driven by the thrust-borer into the completed thrust-borings, as their special joints permit; each joint being made in the pit before the length of pipe enters the thrust-bore.

Copies of Sir Arthur Duckham's presidential address to the Society of British Gas Industries, entitled "Labour's Position in Industry" delivered at the recent meeting at Sheffield have been forwarded to the Prime Minister, to the Board of Trade, to the Ministry of Labour, and to other important bodies.

BRITISH COMMERCIAL GAS ASSOCIATION.

EASTERN DISTRICT CONFERENCE.

The series of district meetings of the British Commercial Gas Association was continued at Norwich last Wednesday, when there was a Business and Housing Conference of the Eastern District Committee, under the presidency of Mr. HENRY WOODALL, M.Inst.C.E., the Chairman of the British Gas Light Company. The proceedings lasted, without a dull moment, from half-past eleven in the morning until about half-past five in the afternoon; and a special feature of the Housing Conference was the number of local people, outside the gas industry, but keenly interested in the subject from other points of view, who took part in the discussion—which is, of course, to say that the gathering was completely successful in the attainment of the object with which it had been arranged.

The Business Meeting in the morning was held in the beautiful Council Chamber of the ancient Guildhall, with an attendance which would doubtless have been much larger but for the scattered nature of the area covered by the Eastern District Committee. Here, when the members had assembled, they were welcomed by the Lord Mayor of Norwich (Mr. George Green), who said he had no doubt that at the conclusion of the meetings Norwich would have participated with them in obtaining a good deal of information of which but for this timely visit it might have remained in ignorance. Everyone fully recognized the mighty power that lay behind the gas undertakings. They felt the comfort of gas in their ordinary daily life; and its economical use had become such a great factor that a conference of this kind could not be regarded otherwise than of much importance. He did feel that a distinction had been conferred upon the city in the selection of Norwich for the meeting place. Of course, the requirements in connection with the new schemes for housing would demand a considerable amount of thought; and free discussion of the matter must prove of infinite service. He drew attention to the wonderful progress that had been made by gas lighting since the small beginning in Pall Mall in 1807.

OPENING ADDRESS BY THE CHAIRMAN.

The CHAIRMAN, on behalf of the Association, thanked the Lord Mayor most heartily for his kind reception, and said those who had something to do with the gas lighting of Norwich knew of the interest Mr. Green took in the undertaking, and the help he was ever ready to give when needed. That he had come there to welcome them was a compliment to the local gas industry, and to Mr. Thomas Glover, the highly efficient Engineer at Norwich of the British Gas Light Company. The first annual meeting of the British Commercial Gas Association was held in Manchester in 1912; and the Chairman at that time was his (the speaker's) father, who was the first President, and the constant friend and supporter, of the Association. He was prone in this way to follow in his father's footsteps. In 1912, his father spoke of the great possibilities of the Association for usefulness to the gas industry and the public it served, and expressed the certain hope that it would make the best of its great opportunities. They would all agree that this forecast had been abundantly fulfilled. The special purpose of the meeting that day was to discuss the question as to how gas people as a body could best help in the solution of one of the most urgent problems in existence—namely, that of housing. It would be folly to suggest that the main object of the Association was other than to forward the interests of the gas industry as a whole; but those of them who knew its chief officials were aware that their horizon was not limited to this. Their view, quite rightly, was that public utility companies must recognize that they were the servants of the public, and not merely dividend-paying concerns. Such undertakings possessed many privileges above other traders, and they appreciated that, because of these privileges granted to them by Parliament, they also had obligations, which they did their very best to carry out. Without wishing to detain them long, there were two points he would like to mention. The first of these was the national necessity that existed for the conservation of coal. The gas industry were convinced, and were prepared to prove to any impartial persons, that their proposals did mean the most economical use of coal. They maintained that, in the national interest, no coal should be carbonized except in closed vessels, whereby all the valuable residuals could be collected and utilized. His second point was with regard to the cost of gas installations in connection with these new houses which were to be put up throughout the country. They would, he felt sure, all agree that there was one class, perhaps above all others, who could justly claim their help and support, and that was the women who had to bring-up families in the smaller houses where no assistance was obtainable. Their hours of labour per week were not 44, but more like 144; and it was the bounden duty of everybody to do all he could to see that these houses were provided with every possible means of saving women labour. They should be able to cook and do their washing, &c., with the least effort and the least resultant dirt; and if they were saved the labour of handling coal and ashes alone, this would be of great importance. They could, however certainly go farther than this. The Association were confident they could prove there would be a large saving in the structural cost of the houses if the authorities adopted gas as the means of cooking, heating, and lighting. This saving in structural cost, together with that of the coal-range and coal-fireplaces ordinarily supplied with houses, would, he believed, be shown to be not less than £50 per house; while the apparatus to be provided would not cost more than about £20. When these figures were proved to the housing authorities, he hoped they would be prepared to pay a large proportion of the cost of installation—not altogether in order that the gas companies might be saved this cost, but because, if the companies had to meet it, they would have to charge a very considerable additional amount to the poorer class of gas consumers. If the companies were called upon to pay (say) £20 per house for providing the gas apparatus, they must charge rent for it; and this, when spread over the comparatively small consumption, would mean quite a big charge per 1000 c.ft.

WORK AND POLICY OF THE ASSOCIATION.

Mr. F. W. GOODENOUGH (the Chairman of the Executive Committee) then addressed the meeting on the subject of the work and policy of the Association now and in the future. In opening his remarks, he said he would like first of all to most heartily associate himself, on behalf of the Association, with what Mr. Woodall had said in thanking the Lord Mayor for devoting some of his very much-occupied time to coming and welcoming the Association in a very fine building in a very fine old city. They all appreciated what the Lord Mayor had said with regard to the gas industry; and he was sure they would wish to thank him very cordially. It was his (Mr. Goodenough's) privilege to say something about the aims and objects of the Association, one section of which the present meeting represented. The Chairman had referred to what his father, the late Sir Corbet Woodall, had said at Manchester when presiding over the first annual conference of the Association. He had pointed to the aim of the Association being to serve both the industry that they represented and the community which the industry existed to serve; and the Chairman had just spoken of the industry being under an obligation to do its best to serve the public, because of the monopoly privileges accorded to gas undertakings. They should not only regard this as an obligation, but should go a step farther, and say it was a common-sense business on the part of any undertaking—whether given monopoly privileges or not—to do the utmost to serve its customers. By serving, he meant to give good service, because it was the fundamental basis of all good business that "he profits most who serves best;" and they could only "serve best" if they possessed the spirit of service—the desire to serve, without undue regard to what they were going to make out of their service. The labourer was worthy of his hire. They were none of them philanthropists; but all they asked was a square deal. They wished to give good value for money; but at the present time the industry was rather in the position of having to ask for its side of the square deal, than of being accused of taking an undue proportion as its share of profit. The bargain between the gas supplier and the consumer had lately been somewhat one-sided. But happily Parliament were now taking this matter in hand. The Association had throughout its propaganda work borne in mind that they could render the very best service to their consumers (as well as to the industry) by educating them in the economical use of gas. It was not without gratification they found, during the war, that a leaflet got out by the Association advising the public on the use of fuels was adopted by the Government as a Government publication, and issued broadcast throughout the country. This was because the Government saw, on investigating the Association's literature, that they were out to tell the truth. All through the period of the war, the Association sought to run its publicity work parallel with the needs of the nation as they from time to time revealed themselves. As the result of the activities of the Coal Smoke Abatement Society, as well as of the propaganda work of the Association, an interim report had recently been issued by the Ministry of Health Departmental Committee on Smoke Abatement, which was thoroughly satisfactory from the point of view of the gas industry. In other words, public interests and the interests of the gas industry had been proved to run in harmony. For various reasons, sufficient to them, people would live in towns; and it was up to to the gas industry to do everything they could to make towns fit for human beings. The report he had referred to marked a great step in this direction. The Association had been concentrating to a great extent on the housing problem; and, in addition to getting the gas-flue recognized, there was about to be issued a standard specification for piping which it was hoped the Ministry of Health would endorse. The greatest encouragement had been received from H.M. Office of Works, who might be taking a very important part in the housing schemes of the future. In Camberwell, the Office of Works had drawn-up the plans, the Council were looking after the finances, and the trade unions were supplying the labour; and it was suggested that this sort of co-operation or arrangement should be followed in other directions. In view of this, it was satisfactory to know that the Office of Works fully realized the value of gas. Having thus dealt with the external service, Mr. Goodenough proceeded to discuss the internal service given by the Association to the industry.

Mr. W. M. MASON (the Secretary), who followed, emphasized the fact that the Association could spend money in bulk to better advantage than individual undertakings could smaller sums.

The CHAIRMAN remarked that, from all that had been said, they might rest satisfied that they were receiving good value for their money.

NEW MEMBER OF THE COMMITTEE.

Mr. GOODENOUGH said that Lincoln having become a full subscriber to the Association, the representation of the Eastern Counties was now entitled to be increased by one; and he proposed that Mr. W. H. Mainwaring, of Lincoln, be appointed to the General Committee.

This was seconded by Mr. J. W AUCHTERLONIE, of Cambridge, and agreed to.

SALES ORGANIZATION.

Mr. F. H. HOLLAND (Director of Sales Organization) then outlined briefly the Association's scheme of organization on the sales side. He dealt with the methods by which commercial costs can be reduced.

THE VALUE OF THE ASSOCIATION.

Mr. J. H. TROUGHTON (Newmarket) declared that he had derived, and was continuing to derive, very great benefit from the propaganda work of the Association. Its usefulness was never-ending, because one was always learning. They had their own "Bulletin," the Editor of which he was pleased to see present. Mrs. Cloudesley Brereton was invariably alive to the most up-to-date methods. They, of course, owed at all times a great deal to the Press; but their own Press they could regard as being most useful to them, because they were constantly gleaning new ideas from it. The gas industry was growing; and, as the late Sir Corbet Woodall said, it would continue to grow years after he had passed away.

Mr. AUCHTERLONIE said he fully recognized the importance of the Association, which he had always regarded as being full of promise. It had more than realized his expectations; and he was very much surprised that there were still some undertakings that remained outside it. He could not understand how they failed to see the absolute necessity of joining. Perhaps if the Secretary could find time to make a personal call upon these undertakings, it might have good effect. The speaker went on to give particulars of the excellent results that had accrued in his own district from the circulation of the Association's literature.

Mr. F. M. PATERNOSTER (Felixstowe) remarked that he made use of the Association in every possible way; and the information, &c., he had obtained had been most valuable, not only to him, but to his Company. It was a great pity that there were not more members in the Eastern District—especially among the smaller undertakings. Such concerns could not afford to advertise much themselves, or to keep a good man for canvassing; and they would get help from the Association which would prove of great service to them.

Mr. GOODENOUGH said he would like those present to express their thanks to Mr. Woodall for coming, at some considerable personal inconvenience, to preside over the meeting. He particularly wished to thank him for all the support he had given to the Association from the time of its inception. He had always been a very strong supporter, as he had mentioned his father was before him. Mr. Mason had referred to the impossibility of individual undertakings spending money in advertising to so great an advantage as the Association could. He would be sorry for it to be thought that the Association did not advocate the spending of money on local papers by the different undertakings. Undertakings individually should advertise as freely as they could in their local papers, while the Association advertised in publications of wider-spread circulation.

The CHAIRMAN, in acknowledgment, said he quite understood that the smallest thing one could do in connection with such a movement as this was to give money. Having seen more of the Association in the last day or two than he had before, he should certainly feel it his duty in future to do more personally than he had done in the past.

A vote of thanks was passed to Mr. Goodenough and Mrs. Cloudesley Brereton, on the proposition of Mr. AUCHTERLONIE, seconded by Mr. PATERNOSTER; and this brought the morning sitting to a close.

A DISCUSSION ON HOUSING.

A move was then made to the Royal Hotel, where the party, together with a number of well-known local architects and others interested in the matter to be later discussed, sat down to luncheon as the guests of the British Gas Light Company. In an ante-room, a number of attractive specimens of gas apparatus had been assembled by Mr. Glover, along with a collection of the Association's literature, some striking diagrams, the model of the Plymouth "All-Gas" Cottage, and enlargements of the plans of it which were reproduced in the "JOURNAL" for the 22nd ult. [p. 789]. Luncheon over, Mr. Woodall (who was in the chair) said there would be no toast list, but the business of the afternoon—a discussion on the housing problem—would at once be proceeded with.

Mrs. CLOUDESLEY BRERETON opened the debate with an eloquent plea for consideration for the housewife—speaking of the bearing of architecture on the saving of human energy. She also emphasized the importance of burning all refuse, and pointed out that reasonably priced gas-incinerators are available for this purpose.

Mrs. STUART said the best brains must be brought to bear upon the solution of the housing problem. Houses should be made as convenient as possible; and the more labour-saving devices that could be installed, the better.

Mr. THOMAS GLOVER said that in Norwich the gas and electricity undertakings worked together in harmony. The electricity undertaking used gas, and the gas undertaking used electricity; and it was very likely they would have adjoining sites for new works. The gas industry wanted to help in the solution of the housing problem; and they believed that they could help a great deal more than had hitherto been realized—how much, he would try to illustrate. They made gas in Norwich equivalent to about 60,000 tons of coal a year. The whole of this heat energy was supplied silently and without visibility through the gas-mains. Just imagine for a moment a slow and ungainly procession of coal-carts taking this amount of fuel round Norwich, which was saved by treating it at the gas-works. This consideration alone was important; but a more important one was that coal so treated at the gas-works not only yielded gas equivalent to the quantity of coal in its applied heat value, but it left behind it half its weight of coke and a number of products of very great worth. People should not be allowed to continue to use raw coal in the barbarous fashion in which it had hitherto been used. This they were all agreed upon. How it was to be brought about was another thing. The gas industry had been doing their best for many years without much recognition; and they thought the time had now arrived when people connected with housing schemes should realize that gas had taken a permanent place in cooking, water heating, and the warming of rooms, and should prepare their plans accordingly. The gas undertakings throughout the country had, as he had said, been quietly doing a lot of good work for a very long time. For instance, his Company had been spending a tremendous lot of capital in providing cooking-stoves for nearly every house in Norwich. Had the time not come when the gas cooking-stove should be recognized as part of a house, instead of the expensive, cumbrous, barbarous coal-range? Mr. Glover passed round photographs of some cottages built out of retort-setting material which was often given away, or sold for very little, for making rockeries and garden paths. With the photograph of the cottage were shown plans, which were got out for the Company in 1912. These plans, said Mr. Glover, met nearly all the latest requirements of the Ministry of Health. They had a gas-heated boiler and a cooking-stove. These two appliances did away with very much of the smoke trouble. Really, there was nothing so crude as the solid-fuel wash-boiler fire. In Yorkshire, it was the rule now to provide gas-heated boilers. In Norwich it was the exception; but where they were installed everyone was pleased with them. The tenants of the cottages to which he had referred were their own workpeople, and they were continually asking when the Company were going to build some more. With new houses of the better class as well as cottages, it must be recognized that people would no longer be content to go on under the old conditions. It should be borne in mind that they were going to provide now for the next fifty years, and so must anticipate what people would likely be asking for—clean methods of heating, with the least amount of work and trouble, plenty of hot water, and gas-fires in the bedrooms. These were the points that should be taken into consideration by those who were designing new houses.

Mr. A. E. COLLINS (the City Engineer) said he was very closely in sympathy with Mr. Glover as to the value of installing gas in houses—and not only those for the working classes. Electricity could not compete with gas for general heating purposes. In Norwich, it was proposed to provide for gas-cookers, but not to charge on the capital cost of the houses the expense of gas-fires for bedrooms, &c. At the present time, the Housing Committee of the Corporation were carrying out an experiment the object of which was to reduce the cost of laying sewers and pipes of all sorts. It was a boring apparatus. Instead of digging trenches, one opened-up two holes at a distance apart, and then, at the desired depth, bored from one hole to the next. The holes might be as much as 150 ft. apart. The cost of doing this was trifling compared with opening-out trenches in the ordinary way. Naturally, the system did not adapt itself to every kind of soil; there must be a certain amount of elasticity. It seemed to him that for the laying of gas-pipes the system ought to represent a big saving.

Mr. TENCH (Architect) explained the plans of the cottages to which Mr. Glover had referred, and went on to relate an instance of a doctor in Norwich who some years ago built himself a house, and put in a number of gas-fires. He was still quite happy with them, and was extending them to other parts of the house.

The CHAIRMAN emphasized the necessity of discussing with people their requirements before getting on with new work.

Mr. BOARDMAN (Architect) thought that everything possible should be done to educate cooks in the use of gas. As to heating, he would like to know the point at which it was economical to go off gas and on to coke.

Mr. JAMES PORTER (a member of the Housing Committee of the Corporation) said he thought that when Mr. Glover came to Norwich gas was very low down indeed; but he started at once to put things on a different footing, and made the public feel that the Gas Company were out to serve them in the very best manner they could. He had a difficult task, because the electricity business had been taken over by the Corporation, and, of course, every loyal citizen thought it was necessary to use what current he could. But Mr. Glover tackled the matter, and introduced a large number of things into the city to make gas popular. He had lighted the streets excellently; and when the Corporation in their wisdom exchanged this system for electricity, he (the speaker) did not think the lighting was so good. A good incandescent gas-burner maintenance system was put in operation, cookers were extensively bought by the Company, and the slot-meter was popularized.

The CHAIRMAN remarked that the tribute just paid was gratifying both to the Company and to Mr. Glover. The Directors held Mr. Glover in very high esteem for the work he had done in the city and the very happy relations he had maintained with the consumers.

Mr. STANLEY WEARING (Architect) said he had at the present moment about 300 houses under way. The advantages of installing gas could not be questioned; but, unfortunately, many of the cottages were rural, and so out of the reach of gas. Where gas was available, it would be a great pity not to make use of it to the fullest extent; but, rather than the architects, he felt it was up to their Association to tackle the Ministry of Health or the Housing Commissioners. In many respects in this housing work it was not what architects wished, but what the Housing Commissioners allowed them to do. Numerous things which architects considered necessities had had to go, because the cost had had to be cut down to the lowest possible point. He

would like to see gas-fires, gas-coppers, and gas water-heaters; but how could it be done? They had to get them passed by the Housing Commissioners, and the price agreed to. They were a long way towards getting them, because of the saving that could be shown in construction; but they were up against a difficulty in the cost of installation. If a financial basis could be reached which the Housing Commissioners would agree to—not the local authorities, remember—architects would, he felt convinced in his own mind, be only too glad to instal gas.

The CHAIRMAN was glad to hear architects were satisfied that gas was the right thing. This was a most important point. No doubt Mr. Goodenough could prove to the satisfaction of them all that the Housing Commissioners were getting very much in sympathy with the gas industry.

Councillor MIDDLETON (Great Yarmouth) declared that 50 p.ct. of the people to-day did not know how to use a gas-cooker. If they wished to make gas a success in these houses, they must first prove its value to the people who were going to use it; and to do this they must supply gas as cheaply as a coal-fire. When people understood that they could save money and work by using these gas appliances, they would demand them only.

Mr. W. W. TOWNSEND (Colchester) remarked that the interim report of the Smoke Abatement Committee, when issued broadcast, would do a good deal to show Housing Committees the character of some of the proposals being put forward now. The question of cost was at the bottom of the whole matter. They could show a saving of labour and cost. One could cook more cheaply by gas than with coal. There was no question of it costing more, unless very unintelligently used. In his own case at Colchester, a scheme was started with a very good arrangement. They were going to have a bath-room and circulating boiler; but to save cost, the whole of this was cut out, except the bath. The only means of getting hot water was from the scullery below. Housing Committees were cutting out gas appliances right and left.

Mr. PATERNOSTER said there was a housing scheme at Felixstowe, and the plans were prepared for the installation of a gas-cooker only. This was turned-down by the Housing Commissioners, who said there must be a kitchen-range. They allowed a gas-cooker, but there must be a range. The Council committed themselves to electricity for lighting; but they had been informed by the Housing Commissioners that they must cut down costs, and in the end they had to do without gas or electricity. It had been a lot of bother; but he had induced them to cut out the electricity, so that they were having gas for lighting and cooking. In other ways the Housing Commissioners had cut down expenses, just in the same way as at Colchester. They had cut out all hot-water arrangements. The whole trouble was with the Housing Commissioners.

Mr. GOODENOUGH, after an interval for tea, replied at length to the various points raised in the discussion—first of all congratulating the British Gas Light Company upon having got together such a representative gathering. Fifty gas-fires were used to-day, he said, where one was used formerly, because of the greater efficiency of the modern gas-fire. They had been doing what they could to bring the Ministry of Health to see eye to eye with them in what the gas industry believed was the ideal thing in connection with housing schemes; and they hoped to be able to do more yet, now that the report of the Smoke Abatement Committee had been issued, because this report was emphatically in favour of gas. They hoped to get the Ministry of Health, in view of this, to issue more definite and more liberal instructions to the Housing Commissioners in regard to what they might sanction in the way of expenditure upon gas appliances. In this, they would undoubtedly be greatly assisted by the fact that they were able to point to a substantial saving that could be effected in the cost of construction by using gas. The provision of gas-fire instead of coal-fire flues had been approved by the Ministry of Health. He trusted gas undertakings would give the widest possible circulation to the report of the Smoke Abatement Committee. As to water heating, there, again, he hoped they might be successful in getting the Ministry to sanction expenditure upon either gas or coke heated apparatus, though he thought coke-fired boilers were particularly to be recommended for the better-class houses. The Office of Works were thoroughly in accord with the proposals for gas. On one big estate 1300 working-class houses were put up, with duplicate services for gas and electricity; and 11 of the tenants chose electricity, and 1289 gas. He agreed with the importance of teaching people how to use gas economically; and this was one of the principal objects of the Association. As to the economy of gas for cooking, he had an interesting experience during the war of the amount of gas needed to take the place of a ton of coal in a big kitchen range. In one case it was found that 3000 c.ft. of gas on the average did the work of a ton of coal. Generally, they found that 10,000 c.ft. of gas took the place of a ton of coal; and this was distinctly more economical than coal. Where there were straightforward runs in open country, the boring machine to which reference had been made might be extremely useful, and obviously money saving; but it would not do in towns. He concluded by proposing a hearty vote of thanks to Mr. Henry Woodall for presiding over the conference, and also to the Directors of the British Gas Company for their generous hospitality.

This was seconded by Mr. MASON, who coupled with the vote the name of Mr. Glover.

The CHAIRMAN, in acknowledgment, said he was glad Mr. Glover's name had been mentioned, because it had been practically entirely upon his shoulders that the making of all the arrangements for the day had fallen.

This concluded the proceedings.

Correction.—In the editorial article in last week's issue on "Vertical Retorts for Small Works," an error appeared through the misreading of a "5" for a "4." The equivalent of 4700 calories per cubic metre appeared as 420 B.Th.U. The writer intended it to be 520 B.Th.U., though, to be scrupulously correct, the figure should be 533 B.Th.U.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

Visit to the Derbyshire Silica Fire-Brick Company's Works.

The Manchester District Institution of Gas Engineers held their One Hundred and Eighty-Seventh Quarterly Meeting on Friday last, under strange, but deeply interesting, circumstances. The Committee had accepted, on behalf of the members, a long-standing invitation from Mr. John West, J.P., M.Inst.C.E., of Southport, to visit the Derbyshire Silica Fire-Brick Works, at Friden, near Buxton, of which he is the head. It may be mentioned here that Mr. John West read a paper before the Association in May, 1916, on "Silica and Fire-Clay Materials," in which he mentioned, among others, the silica materials manufactured at these works.

Motor char-a-bancs awaited the arrival of members at Victoria Station, Manchester, and Edgeley Station, Stockport. A pleasant journey of 26 miles through lovely country to Buxton was anticipated; but the bright hopes of members were not fully realized, for rain fell heavily at times. Then, the day before the meeting, a "lightning strike" was declared by gas workers in Manchester and a few neighbouring towns, including Salford and Stockport. This, of course, kept some members away. All the same, when the visitors assembled at the Palace Hotel, Buxton, at noon, under the presidency of Mr. E. H. Hudson, of Normanton, to partake of the hospitality of the Derbyshire Silica Fire-Brick Company, Limited, about 120 were there. Sitting next to the President were Mr. John West, Colonel Woodall, Mr. S. Tagg, Mr. Fred J. West, Mr. J. P. Leather, Mr. Harold Davies, and other members of the Council. Several letters appreciative of Mr. West's great work on refractory materials were received; and apologies for absence were sent by the President of the Institution of Gas Engineers (Mr. Thos. Goulden), Sir Dugald Clerk, Dr. Mellor, Dr. Colman, Dr. Parker, Mr. Thos. Hardie, Mr. Chas. Wood, Mr. F. J. Bywater, Mr. S. Glover, Mr. John Bond, and others. Everyone present was pleased to see that Mr. John West was in great form, and that he evidently enjoyed the proceedings fully as much as his guests, who were all surprised at the magnitude of the works, with their 39 kilns.

THE BUSINESS MEETING.

After a generous repast, the business of the meeting was attended to very quickly. Minutes of the previous meeting were "taken as read."

NEW MEMBERS.

A cordial welcome was given to the following new members: Mr. James Bridge, of Bolton; Mr. Horace Chamberlain, of Sheffield; Mr. J. E. Lister Cooper, of Yeadon; Mr. Herbert Duxbury, of Llandudno; Mr. Ralph Halkett, of Sheffield; Mr. G. P. Mitchell, of Blackburn; and Mr. Robert H. Ruthven, of Morecambe.

HONORARY MEMBERS.

The PRESIDENT said the next business was to elect two gentlemen as honorary members. There had been up to that time only one name on the roll of honorary members, and that was Sir Dugald Clerk. Now the Committee proposed to add the names of Mr. John West (a name well known and highly esteemed in the gas industry) and Mr. C. E. Jones, of London. Mr. Jones became an ordinary member of the Institution in 1875. He afterwards served on the Committee, and occupied the presidential chair in 1885. Three papers were contributed by Mr. Jones; and in 1898 he resigned. His interest in the Institution had never ceased; and not long ago he asked to be reinstated as a member. The Committee, however, thought it would be better that his name should be placed on the roll of honorary members. He accordingly proposed the election of Mr. Jones as an honorary member.

Mr. TAGG (Preston) seconded the proposal; and it was heartily agreed to.

The PRESIDENT, in submitting the next name, said it was that of a man who had done most valuable work for the gas industry. Mr. West was originally a gas engineer in charge of the gas-works of the Manchester Corporation. Finding more lucrative opportunities for the exercise of his talents, however, he left the Corporation's service, and began business on his own account. As a consequence, he had to resign his membership of the Institution. Since that time Mr. West had done a great deal more for the gas industry than he could have done if he had remained Chief Engineer in the gas department of the Manchester Corporation. He had from time to time introduced new appliances to the advantage of the industry, and had shown the need for great care in the preparation of the materials used in modern systems of carbonization. In the old days, gas engineers paid little regard to the materials they used, inasmuch as these materials could be got at the works. But now they had to pay very close attention to the quality of the materials they put into the furnaces. In these circumstances, Mr. John West (illustrating the foresight he had shown throughout his career) considered carefully the question, and set himself to produce a material that would meet the requirements of gas manufacturers. This was the gentleman whom he wished to nominate for the position of third on the list of honorary members. It was the only honour they could bestow,

and he thought it would be a great honour to them as an institution if Mr. West would accept their offer and grace their membership by the inclusion of his name in their list. He therefore proposed that he be elected as an honorary member.

The proposition was received with acclamation, and having been seconded in appropriate terms by Mr. J. P. LEATHER (of Burnley), it was put to the meeting and carried enthusiastically, the members singing "For he's a jolly good fellow."

A VOTE OF THANKS.

The PRESIDENT then moved a vote of thanks to Mr. West and his colleagues of the Derbyshire Silica Fire-Brick Company for the entertainment already provided, and for that which the members of the Institution were to receive when they visited the works at Friden. He was glad that there were no papers for consideration on this occasion, for his view was that they would receive more instruction from a visit to the works in question than if they had a paper on them. Mr. West had said if anyone wanted further information on any point he would be glad if his questioner would write to him. To that proposition he (the President) said "No;" for he feared, if writing for information in this way were allowed, they would have Mr. West inundated with letters. The visit would be most instructive, of that he felt sure; for the more they knew of the raw materials they had to use the better they would be as managers and engineers of works. When the Committee received Mr. West's kind invitation, they willingly accepted it, feeling they would owe a debt of gratitude to the Derbyshire Silica Fire-Brick Company. He therefore proposed that they tender their heartiest thanks to Mr. West and his co-Directors for giving the Institution the opportunity of visiting their works, and for their hospitality.

Mr. TAGG, in seconding the motion, said they had elected Mr. West as an honorary member in recognition of the valuable work he had done for the gas industry. Now Mr. West's regard for the gas industry was evidenced by his invitation to visit his Company's works, and by the excellent arrangements he had made for the members' comfort.

The resolution was passed most heartily.

Mr. WEST expressed his thanks for the honour of being made an honorary member of the Institution. He then made playful reference to his former membership. When, he said, he was a gas engineer he was deemed worthy to be an ordinary member; but when he engaged in business he became an exile and a castaway. He was glad, however, to be retaken into the fold. He went on to say he was very anxious this should be an educational meeting. He read a paper before the Institution four years ago, giving much information concerning these works, and the things produced there; but he thought men might learn more in half an hour by a visit of inspection than they could from a long paper.

AT THE WORKS.

The party proceeded by motor coaches to the works at Friden, situated some 12 or 14 miles from Buxton. Again the rain and clouds checked the enjoyment of the journey; but the works, when reached, were found to be full of interest.

The works of the Company are in the heart of the country, and stand at an altitude of over 1000 ft. from sea level. They are within 12 miles of Buxton, and a similar distance from Ashbourne, Rowsley, and Bakewell, but on the High Peak Goods Line—one of the oldest lines in the country. They are spacious, and are planned in such a way that the raw materials come in one end and go forward in the order of manufacture until the finished goods are loaded-up on to the private railway-siding of the Company. Briefly, the special manufacture of the works is that of silica goods of different qualities to suit various conditions. The materials are in use in a large number of gas-works in this country and abroad, and are also employed largely for other purposes—such as coke-ovens, steel works, &c.

The party on arrival were conducted to the entrance of the silica stores, where several wagons of raw materials from the pits were standing; and here Mr. John West welcomed the party, and described the different qualities of the several samples, and gave a general outline of the various processes of manufacture. He said one sample was from the Company's Friden estate. It contained 96 p.ct. of silica, with a small proportion of alumina. Bricks made of these two substances would stand a very high degree of heat. Another sample, containing 90 p.ct. of silica, when properly mixed with other materials, made a brick that neither expanded nor contracted. But the best brick for practical purposes was one which allowed a slight amount of contraction and expansion. Such a brick was standing the test of time and turning out very satisfactory.

The company was then split-up into various groups, and taken round the works, following the order of manufacture. First the large silica stores and grinding sheds were inspected, and the special mixing of the several qualities was noted; and it was pointed out that the silica content in the several qualities had not varied more than ½ p.ct. during the last ten years. The material, after being ground and mixed dry, is then elevated into bins, where it is watered and left soaking for about a week, during which time the small particles of finely ground alumina become very soft and plastic, and permeate into and around the particles of silica, so that, when the material is passed through the large pug mills and pugged, it is very plastic to work up.

From the pugs the material is passed through the wire-cutting machines, and delivered in various clots or sizes to the presses, to be made into squares or shapes according to requirements. The presses were specially designed, and are strongly built to suit the material. Practically the whole of the materials are pressed into various shapes by the presses, only a very small percentage being hand-moulded. Mr. West explained that, after many years of costly experimenting, they had found that the pressed brick was superior to the hand-made; and he was pleased to see this fact was confirmed by the recent investigations of the Research Committee of the Gas Institution.

After inspecting the machinery, the party were shown the various methods of drying—namely, heated floors of large area and tunnel dryers—and they also examined several moulds and shapes arranged to demonstrate the many different patterns required. Various experimental bricks were seen on the floor, which had just been made under the guidance of the School of Science and Technology of Stoke-on-Trent, in connection with tests for the Refractory Materials Committee of the Institution of Gas Engineers.

The members afterwards went round the large range of kilns, where they saw the materials being burnt-off at a temperature of 2500° Fahr. at the wicket, which is the coolest part of the kiln; and here they noted that keen observation was taken in burning-off the kilns by a regular and systematic chart of burning. This all goes to produce a uniformly-burnt brick at the maximum efficiency of the kilns. The visitors then passed round the several sidings, and saw the material being loaded-up and packed ready for despatch.

On leaving the works the party motored back to Buxton for tea, through the beautiful Peak Country, *via* Haddon Hall, Bakewell, and Ashford Dale, and thence into Stockport and Manchester after having spent an instructive and enjoyable day, during which they had gathered how much can be accomplished in a fire-brick works by organization and attention to details. A feature which was noted with satisfaction by members of the party was the cleanliness and airiness of the buildings, and the comfort in which the people work.

A BAFFLE-BRIDGE FOR COKE STEAM-BOILERS.

With a view to facilitate the use of coke breeze and other low-grade fuels for steam raising, there has been designed a patent baffle-bridge for boiler furnaces, which is made by Messrs. Gallagher and Crompton, of Romiley, near Stockport. One of the principal objects of the devices is to materially reduce the arduous labour in cleaning fires which attaches to the use of such fuel; and this gives it a strong claim to consideration. In addition to assisting firemen to clean-out quicker, it saves fuel and prevents loss of steam pressure during the operation, which can be performed in a few minutes with this baffle-bridge, without burning the fires down, and without allowing cold air to enter the flues.

With fires in normal condition, as the gases are given-off from the fire, they are not suddenly restricted, as with the ordinary bridge, but a large combustion space is provided; the passage being more gradually restricted, and projecting blocks provided to assist in mixing the air and gases. The baffle also forms an extended heat-radiating surface to help combustion and radiate heat to the flue-plates. When cleaning-out, the live fuel is pushed back on to the baffle (instead of being burned down), where it is interposed in the passage of the cold air entering the furnace-door and passing through the bars—thus allowing combustion to continue. The whole of the clinker and ash can be removed in one operation. There is no necessity to move the live fuel from one side of the grate to the other; and, as a much larger body of fire is left to start-up with, the fall in steam pressure is reduced to a minimum. On an evaporative test, a saving of 8·81 p.ct. was made as a result of installing the baffle-bridge furnace, which meant a reduction in coal of 150 tons per boiler per annum. The evaporation was also increased by 13 p.ct.

Mr. A. B. Cartland, of No. 3, Creechurch Lane, Leadenhall Street, E.C., is the London Agent for this device, which we are given to understand the Gas Light and Coke Company have recently decided to instal in connection with boilers which are in use at two of their stations.

Another appliance intended to save the time of the engineer and technical man, to which Mr. Cartland also draws attention, is the Crompton-Gallagher boiler efficiency calculator—an instrument designed to facilitate the calculation of the thermal efficiency and other data bearing upon the running of boiler plant. With this instrument at his hand, the operator is enabled to find the factor of evaporation for any given conditions (without the use of tables or arithmetical processes), by the simple movement of a scale and chart. By the same simple process in either case, this factor can be obtained either for saturated steam or steam superheated to any temperature within the usual limits. Then, the factor having been obtained, the equivalent evaporation from and at 212° Fahr., and the efficiency of the plant, can be worked out by moving a second sliding-scale. It is also possible to work out the increased efficiency due to utilizing the waste heat in flue gases by the use of economizers, or that due to superheating the steam.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Mr. George Helps and Thermal Efficiency.

SIR,—Mr. George Helps, in his letter published in your issue of July 7, obviously fails to understand or answer my letter dated June 25. He defends the use of methods of calculation and comparison found in his patent specification of 1917 (No. 111,495), which I have not attacked, and then passes on to an extremely irrelevant and fallacious attack on the conclusions of the Clerk-Smithells-Cobb report of April 14, 1919.

To assist Mr. Helps to a comprehension of the true position, it is desirable to state the facts very briefly.

For some years past Mr. Helps has been endeavouring to improve the methods of coal gas manufacture; and on Aug. 26, 1916, he applied for provisional protection for an invention for which he filed the complete specification on March 26, 1917. In the complete specification he makes detailed calculations of the course and results of "Present Gas-Works Practice," "Carbonizing Coal—Coal Making" at page 5 of the specification. At pages 6 and 7, he makes similar calculations for what he calls "Practice According to this Invention" "Gasifying Coal—Gas Making."

In both cases he calculates out the efficiency of the gas-making process, for the first case as 56 p.ct., and, for the second case as 83 p.ct. The first case dealt with what Mr. Helps considered as ordinary gas-works practice in 1917, and the second case with complete gasification of coal by processes which are not specifically described but from indications given may have been by modifications of the ordinary long-established water-gas plant. The efficiency given for complete gasification is obviously an efficiency hoped for, but not yet obtained, in water-gas plant. The efficiency given by Mr. Helps on page 5 for "Present Gas-Works Practice" is obviously the result of actual tests within Mr. Helps's personal knowledge.

So far as ordinary gas making by carbonizing was concerned, it is important to note that Mr. Helps had calculated the thermal efficiency as 56 p.ct. in the year 1917. At that time he could no doubt have said that if all gas-works of the country were as efficient as those he tested, the efficiency of gas making or generation was 56 p.ct.

In the latter half of 1918, Messrs. Clerk, Smithells, and Cobb were asked by the then President of the Institution of Gas Engineers (Mr. Samuel Glover) to consider among other things the thermal efficiency in gas production or generation as practised in the United Kingdom at the whole of the gas-works of the country, and arrive if possible at the average efficiency for a year's working. This was a difficult problem; but they ultimately obtained sufficient data, of the ordinary practical operations, to come to a general conclusion. The thermal efficiencies of a year's gas making at the Gas Light and Coke Company and the South Metropolitan Gas Company were determined respectively as 47·8 and 46·3 p.ct. That of a separate test of horizontal retort carbonizing by Mr. Ferguson Bell was found to be 57·4 p.ct. The three values 47·8, 46·3, and 57·4 p.ct. of Clerk, Smithells, and Cobb in 1918 thus agree well with the 56 p.ct. found by Mr. Helps about a year earlier. The methods of calculation used in 1917 by Helps, and by Clerk, Smithells, and Cobb in 1918 were identical; and they were made independently of each other.

It is difficult to see where Mr. Helps differs from me now. We were certainly agreed both as to results and methods of calculation, comparing with Mr. Helps of 1917. But Mr. Helps of 1917 appears to be a very different man from Mr. Helps of 1920.

He now contends that the method used by himself and by Clerk, Smithells, and Cobb was erroneous, as "only 50 parts are gasified, as roundly 50 parts of coke are left over and allowed for at 100 p.ct. efficiency."

Here he needlessly accuses himself and me of serious error; and he does this because he misuses the term "efficiency." There is no question of thermal efficiency involved here. The coke can readily evolve 50 p.ct. of the original heat of the coal, and as economically apply that heat to useful purposes as the original coal. Consequently the whole of its heat must be considered as still available for use. No question of the thermal efficiency of coke production arises in that connection. Consequently no error has been made by Mr. Helps of 1917 or by me in 1919.

Mr. Helps further boldly states that the thermal efficiencies of gas making cannot be compared with the thermal efficiencies of electricity generation, and that such comparisons "are entirely without foundation in fact."

It is indeed surprising that a man of Mr. George Helps's technical experience should be so ignorant of fundamental principles as to be capable of making and believing such statements.

Mr. Helps is anxious to be corrected. He is quite wrong in his opinion; and he may take comfort in the fact that I now correct him, and direct his attention to the fact that all the efficiency calculations in the Clerk, Smithells, and Cobb report are based on working results with gas and electricity, both on the very largest scale.

With regard to Mr. Helps's postcript, he is quite wrong here also. He proposes no particular gas-making apparatus or process in his specification, and does not in any way indicate the use of "a continuous vertical gas retort" in combination with a water-gas plant.

With reference to the editorial in "Gas" (referred to in my letter of June 25), Mr. Helps's editor is as absurdly fallacious as Mr. Helps himself. The editorial contains many fallacies, including the following:

(1) The efficiency of electro-dynamic transformation in an electric motor is compared with the efficiency of thermo-dynamic transformation in a gas-engine.

(2) The proportion of heat in gas produced from coal is taken as the thermal efficiency of gas production.

(3) The efficiencies of gas and electricity generation are confused with efficiencies of use of both in cooking and heating.

It may later be worth while to write an article for the "JOURNAL," clearing-up these matters; but meantime it will prove a profitable exercise for Mr. Helps of the 1917 specification to reason with Mr. Helps of 1920 and his editor, so as to come back to an attitude of sanity with regard to the treatment of thermal and other efficiencies.

57 *and* 58, *Lincoln's Inn Fields, July* 9, 1920. DUGALD CLERK.

Neutral Sulphate of Ammonia.

SIR,—Referring to Mr. Sheard's recent statements on the above subject, at Stafford, during the past two years, we have been making neutral dry sulphate of ammonia by the South Metropolitan process; and our experience of the stored material does not confirm Mr. Sheard's conclusions. On careful consideration, we are under the impression that Mr. Sheard has studied the question in an incomplete way, as all his experiments are on small samples in thin layers; whereas the behaviour of sulphate of ammonia when laid out in thin layers and stored in bulk is very different.

We agree that sulphate of ammonia, whether neutralized or not, will, if exposed to varying degrees of humidity, contain from time to time varying quantities of water. This is especially the case when spread out in thin layers; but there is a great difference in the hardness or the caking effect of (*a*) acid sulphate of ammonia, (*b*) ordinary neutral sulphate of ammonia (*c*) neutral dry sulphate of ammonia, especially as to the depth of the caking of the surface or crust in the heap.

We find that the sulphate of ammonia made by the South Metropolitan process—which is not simple neutralization alone, but consists of neutralization and drying by a special method in one operation, the resulting sulphate of ammonia being of a constant fine bluish grey colour—when stored in a heap, does, after some days, cake on the surface from ¼ in. to 1½ in. deep; but the remainder of the heap is apparently protected, and remains unaltered in physical condition. Even the caked material on the surface crumbles in the fingers, though it may contain a relatively high percentage of moisture. But this is quite different to the very hard caking effect which takes place with ordinary acid sulphate of ammonia.

Mr. Sheard's conclusions might lead those who have no experience of neutral sulphate to believe neutralization to be unnecessary; but we have a large amount of testimony from farmers and others who have used the new sulphate of ammonia that it is much more satisfactory to apply and use. In fact, recently when, owing to a breakdown, we had for a few days to revert to acid sulphate of ammonia, we found it impossible to dispose of it to local farmers, and, therefore, had to send it out of the district.

We have neutral dry sulphate of ammonia which has been in single twill bags for from six to twelve months. There is no deterioration of bags, and no outward signs of moisture; and if one of these bags is turned out it is found not to have caked, although it may adhere where it has been on the surface of the bags. But this is easily crushed by the fingers, which is a very different thing to acid sulphate of ammonia, which would require a mallet to break it up.

Gas-Works, Stafford, July 8, 1920. W. M. VALON.

REGISTER OF PATENTS.

Gas-Meters.—No. 132,508.

JOHANSON, G. K. V., of Stockholm.

No. 21,655; Sept. 3, 1919. Convention date, Sept. 9, 1918.

These meters are of the kind which comprise two measuring chambers (separated by a movable diaphragm) which may alternately be brought into communication with the inlet and outlet by valves which are opened and closed by the movements of the diaphragm caused by the pressure of the gas in the measuring chambers. When the one measuring chamber communicates with the inlet, the other chamber communicates with the outlet, so that the gas pressure in the first chamber will rise owing to the gas flowing into it. The diaphragm will slowly move towards, and into, the last mentioned measuring chamber, which communicates with the outlet as the gas in the chamber escapes through the outlet. Gas-meters of this kind have, says the patentee, been designed, in which the diaphragm operates the valves by spring mechanism compristng a tension spring actuating a lever which, notwithstanding the slow movements of the spring mechanism diaphragm, effects a rapid opening and closing of the valves, so that no gas can pass through the meter without being measured. Spring mechanisms heretofore proposed for this purpose have the disadvantage, however, that their resistance to the movements of the diaphragm varies within comparatively wide limits, with the result that the pressure in the gas-pipes beyond the meter (and thus also at the gas-jets) becomes uneven.

The purpose of the present invention is to provide an arrangement of spring mechanism for transmitting the movement from the diaphragm to the valves, by means of which mechanism this inconvenience is avoided. The improvement is broadly characterized by the fact that the spring is stretched between the free ends of two pivoted levers, one of which is connected with the diaphragm and the other with the valves. The turning of the levers is limited in such manner that they are only capable of moving through small angles to either side of the connecting line between the turning points or fulcra of the levers. In this manner the variations in the length of the spring occurring by the movements of the mechanism are inconsiderable, and consequently the load on (or the tension of) the spring becomes as constant as possible. Also the counter-pressure against the movements of the diaphragm and also the gas pressure at the gas-jets become practically constant.

The levers are so arranged relatively to one another that the pull of the helical spring on each lever is always directed approximately towards the turning point of the lever—that is to say, so that it has a

component the continuation of which runs through the point. In this way it is secured, on the one hand, that the spring mechanism requires a small space, and, on the other hand, that the stretching of the spring begins immediately after the reversal of the direction of movement of the lever connected with the diaphragm. On account of this, the opening and closing of the valves also take place rapidly.

Carbonization and Gasification Plant.—No. 143,602.

DAVIES, W. E., of Penygraig, South Wales.

No. 4339; Feb. 21, 1919.

This invention comprises means for the withdrawal of gas or vapour from fuel distillation plants "wherein they are produced or passed-in for heating, carrying, or reacting purposes." The invention particularly applies to distillation, gasification, or like plant, but also extends to retorts for the synthetic manufacture of ammonia.

The inventor points out that he has previously patented such a construction for withdrawing gas from coke-ovens—see patents Nos. 131,105 and 136,880. He finds, however, that the construction of flues described is not limited in its application; and now wishes to specifically claim such construction of flues for withdrawing gases from retorts not using electrical power, but of otherwise general application.

The present invention provides means for the withdrawal of gas or vapour from a retort, with control at will over the suction and consequent retort pressure. The gases leave more or less at right angles to the withdrawal wall—that is, transversely to the charge. A rapid falling pressure, absolutely by expansion (or relatively by dilution with other gas) thus causes a rapid fall in the partial pressure, which greatly favours the conservation of the products by rapidly cooling them and thus ensuring their isolation in greater quantity. This particularly applies to synthetic ammonia recovery.

Gas-Cookers.—No. 143,701.

WALL, H. A., of Mitcham.

No. 11,455; May 7, 1919.

This invention relates to a gas-cooker as ordinarily constructed for domestic use; but, instead of the grilling burner forming part of the hot-plate, there is a separate attachable griller or griller-oven so arranged as for its grilling burners to be automatically connected with a tap attached to the cooker, so that by placing the griller in position on the hot-plate its oven will be heated by the burners on the cooker itself. The griller is so constructed as to be liftable on to or off the cooker like an ordinary cooking utensil as and when required, or temporarily attached to either side of the cooker and so folded out of the way when not in use.

Heating and Lighting by Inverted Incandescent Burners.—No. 144,372.

FAUCONNIER, E. and SIMPERE, A., of Paris.

No. 5629; March 6, 1919.

This invention relates to incandescent burners to the gas-mixing chambers of which water vapour is supplied from a vessel heated by the products of combustion from the burner.

The apparatus comprises one or more inverted incandescent burners, each having a cylindrical or truncated conical burner mouth of refractory material, the major portion of which projects into the central part of an ordinary inverted incandescent mantle. The burner mouth is open at its upper end where it is connected to the pipe through which the mixture of air and gas or combustible vapours enters. It is closed at its lower end by a grating, and is in combination with a horizontal trough supplied with water. It is closed by a cover having holes for the admission of air, which passes through the trough before entering the mixing chamber of the burners. The burners are so connected to the water trough that the heat of combustion from them produces within the trough steam, which, together with the air of combustion, is drawn into the mixing chambers of the burners.

Recovery of Cyanogen from Coal Gas.—No. 144,398.

HOOD, J. J., D.Sc., of Canonbury Park North.

No. 6445; March 14, 1919.

The object of this invention is the recovery of the cyanogen found in crude coal gas, "owing to the decompositions that take place during the destructive distillation of coal."

As is well known, says the patentee, the cyanogen radicle exists in several forms in coal gas. It is present as sulphocyanogen—probably in the form of ammonium sulphocyanide—and this body is also continuously being formed in the gas during its passage through the purifiers by the action of carbon bisulphide on ammonia, forming ammonia sulphocyanide, and liberating sulphuretted hydrogen. This ammonium sulphycyanide is more or less recovered by washing or scrubbing arrangements—particular means being adopted to accelerate the reaction between the constituents CS_2 and NH_3 and thereby to increase the yield of sulphocyanide.

The hydrogen cyanide in crude coal gas probably exists as cyanide of ammonia, which is frequently recovered by washing the gas with a solution of salts of iron contained in suitable scrubbing apparatus; prussiates of ammonia or other base being formed thereby. In many gas-works it is not found convenient to adopt a special washer to eliminate the cyanogen from the gas; and in works where such apparatus is employed, the recovery of the cyanogen is not complete—much of it passing through the scrubber into the other parts of the purifying apparatus.

The purpose of the present invention is to recover the cyanogen without employing a special scrubber, as well as to recover the portion of it which the scrubber fails to collect. Hydrocyanic acid, which is a very feeble acid, probably exists in coal gas under certain conditions as cyanide of ammonia; and because of its weak acidic character, it is readily expelled from its compounds by carbonic acid and sulphuretted hydrogen, there being a large excess of these constituents in coal gas.

The result of this is that when the crude gas is passed through a fresh carbonator—*i.e.*, a purifier containing slaked lime—the three acidic bodies HCN, CO_2, and H_2S (or their compounds with ammonia), are in the initial stage retained by the strong base lime; but after a time the CO_2 displaces the H_2S and HCN, which pass into the forward tiers of the lime purifier, and finally the HCN is displaced by the H_2S. Thus the HCN is invariably in front as it were of the H_2S, and this body in front of the CO_2, until the lime is completely carbonated; the H_2S and HCN being expelled into oxide of iron or other material.

To avoid this continuous expulsion or driving forward of the HCN, the inventor proposes to drench the slaked lime in a tier near the exit—preferably the last tier of a freshly charged purifier—with a solution of a salt of iron (preferably green vitriol); whereby hydrated oxide of iron is immediately precipitated by the lime and is co-mingled with the excess of lime. Coal gas is now passed through the purifier, and the HCN, as it is expelled by the H_2S and the CO_2 into the treated tier of the lime, comes into contact with the alkaline hydrated oxide of iron. This forms prussiate of calcium, which is not decomposed by the excess of CO_2 or H_2S when these gases meet the cyanogen now fixed as prussiate. The cyanogen is thus removed from the coal gas at the part of the purifier at which the quantities of carbonic acid and sulphuretted hydrogen are at a minimum.

When the purifier is exhausted or completely carbonated, the portion of its contents containing the crude prussiate is collected and subjected to leaching or agitation in a suitable manner with a dilute solution of alkali (such as sodium carbonate) to decompose the calcium prussiate. The alkali prussiate so formed is collected by evaporation and crystallization.

Igniting Apparatus for Gas-Burners.—No. 144,535.

HOLM-HANSEN, E., of Horsholm, Denmark.

No. 24,638; Oct. 8, 1919.

The arrangement consists of a rectangular casing, in which is a hollow operating member, closed at the ends and mounted in such manner that it is movable in the direction of its length. In the hollow member there is mounted a pivoted sleeve, in which one end of a bar or plunger is carried. The other end is connected by a simple joint to a lever pivotally mounted on a pin carried in bearings in the side walls of the casing. The lever is provided at its free end with a pin of pyrophorous material, which is pressed out by a spring against a roughened and slightly bowed plate or striking member arranged in the hollow end of the lever to the rear of the pin. The plate is connected with the casing by two bars forming continuations of the upper and lower walls of the casing. In the sleeve is a spring, one end of which presses the plunger in the outward direction; while the other end lies against a ball fitted at the end of the sleeve. By means of this spring the bars are normally maintained in a position inclined one to the other. When the member is pressed to the one side, the spring is compressed until such time as the two bars come to lie in alignment. As the operating member is pressed still further, under the action of the spring, the bars take up a position inclined to one another in the opposite direction—producing a spark to effect the lighting. When the member is moved back, a fresh spark is produced.

Chirk Gas Purchase Proposal.—The Chirk Council have decided not to entertain a system of lighting for the district by electricity, but to continue with gas; and they have asked the Gas Company to fix a price for the purchase of their works by the Council.

Bakewell Gas Profits.—As a result of the past year's working, the Bakewell Urban District Council Gas Committee have a credit balance of £550, compared with a deficit of over £1100 at the beginning of the year. The Chairman of the Gas Committee (Mr. H. Lomas), when introducing the report to the Council, stated that twelve months ago, when he was elected to office, they had had four unfortunate years, and there was a feeling in the town that the gas-works were obsolete. The debt which had accumulated during this time was largely due to the high price of coal and labour. He suggested that the present profits should be handed over in relief of the rates. Mr. Smith pointed out that the Gas Committee had "put its house in order" before the appointment of Mr. Lomas as Chairman. With regard to the suggestion to hand the profits over to the rates, no action was taken.

Loughborough Gas Undertaking.—At the last meeting of the Loughborough Town Council, the Mayor (Mr. W. F. Charles), in moving the adoption of the annual report of the Gas Committee of which he is Chairman, said that the cost of manufacture had increased by 30 p.ct.; the extra expenditure upon coal having been £4917. Wages had increased by 70 p.ct., and repairs and renewals had gone up 61 p.ct.; this being mainly due to the fact that during the war period the works had been somewhat neglected, and an extra amount of work had to be done when prices of labour and materials were very high. The amount received from sales of gas had been £27,778, against £21,528, an increase of £6240. Residuals sales had increased by £2477; the total increase from sales of all kinds being £8757. Expenditure was more by £10,181. They had made a gross profit of £6880; but the charges for interest, sinking fund, &c., amounted to £9906. This absorbed their credit balance of £1788, as well as the year's profits, and left them to carry forward a deficiency of £1237. There had been an increased consumption of 1000 tons of coal, but 14½ millions c.ft. of gas more had been made, which meant that by economical manufacture they produced much more in proportion.

PARLIAMENTARY INTELLIGENCE.

GAS REGULATION BILL.

Second Reading in the House of Lords.

Last Thursday was the day appointed for the second reading in the House of Lords of the Gas Regulation Bill.

The MARQUIS OF LONDONDERRY said the Bill might be shortly described as one for the reconstruction of the gas industry. In a way it was a complement to last year's Bill for the reconstruction of the electrical industry, though the problems were different—last year's Bill being chiefly one to abolish the limitations of area which were throttling progress. This particular difficulty had not yet been felt in the case of gas, which was not supplied over long distances. But the gas industry had been subjected to restrictions—such as fixed standards of quality, formerly luminous and later of calorific value, which were no longer in harmony with modern scientific notions, and prevented the most economical use of coal. The Bill dealt not only with the quality of gas, but also with the charges levied for it. The industry had been hard hit by the increased cost of coal and labour, and the existing statutory prices were now entirely out of date. But for the Temporary Increase of Charges Act of 1918 many of the undertakings would be practically bankrupt; and it would be generally agreed that the time had come to restore the financial stability of the industry and enable it to resume its progress. After briefly glancing at the main provisions of the Bill, his Lordship pointed out that it applied to undertakings owned by local authorities as well as to companies' undertakings carried on under statutory authority. According to the latest available returns—those for the year 1913—there were 831 statutory gas undertakings in the United Kingdom, of which 312 were owned by local authorities, and 519 by companies; and they supplied more than seven million consumers. The capital invested in the undertakings, including money borrowed by local authorities, was over £140,000,000—£45,000,000 representing the local authorities' borrowings, and £95,000,000 representing the share and loan capital of companies. The three London companies accounted for £41,000,000 of the latter amount; so that outside London the gas supply of the country was about equally shared between local authorities and companies. It was well known that gas undertakings had only been carried on during the war, and since 1918, under great difficulties arising from coal shortage, the high prices of raw materials, and the increase in labour costs. The service which the industry rendered to the country during the war in the production of benzol and toluol for munitions purposes, and in other ways, could hardly be over-estimated; and he was very glad to have an opportunity of paying a tribute to the gas undertakings for the patriotic work they did during the war. It was but bare justice to the industry to recognize that this had been done in the most discouraging circumstances. Under the operation of the statutory provisions relating to price and dividends (which were admirably suitable for normal conditions, but were unable to bear the strain of the abnormal conditions arising out of the war) the financial stability of all classes of gas undertakings was being seriously undermined; and, notwithstanding the greatly increased demands of the community they supplied, profits were steadily declining. The serious increase of costs, which had then already begun to take place, led to the passing of the Statutory Undertakings (Temporary Increase of Charges) Act, 1918, the operation of which was limited to two years after the termination of the war. More than 200 companies and nearly 150 local authorities had taken advantage of the relief afforded by the Act. The general result of the changes that had taken place had been so serious as to impair the whole financial credit of the gas industry; and in the interests of the community it had become imperative that steps should be taken to restore it. Before the war most companies could, without difficulty, raise all additional capital they needed at or above par; and many undertakings were able to issue debenture stock at 4 per cent. and even lower. It was obvious that it would not be possible in future—certainly not for many years—to issue capital at such rates. Practically no ordinary stock was being issued at present; and the rates payable on preference and debenture stock approximated to 7 p.ct. The statutory obligations of the undertakings could not, however, be fulfilled without expending a great deal of fresh capital within the next few years; and unless steps were taken to restore the credit of the industry, it would either be impossible to raise the necessary money or it must be raised on such onerous terms that the burden on the existing shareholders and future consumers would be almost intolerable. It did not appear possible to deal with the situation by a merely temporary measure. No investor would put his money in a gas undertaking on a security which did not possess at any rate some degree of permanence. There was, in fact, no possible alternative to giving both companies and local authorities some permanent relief from the onerous conditions with regard to price, which, in the circumstances at present existing, and likely to continue for many years, had become not only inequitable, but actually impossible. The principle upon which it was proposed to deal with this question, as laid down in the Bill before the House, was then explained by his Lordship, as also the reasons that led to the Government approaching the question in the way they had decided upon. He then dealt with the statutory restrictions that it was proposed should in future replace those now in force (as set out in clause 2 of the Bill), by which provision was made that gas should be free from sulphuretted hydrogen, and that, under normal conditions, it should be supplied at a prescribed minimum pressure. In the Bill as introduced power was sought where necessary to limit the proportion of inert or incombustible constituents in the gas. It was not thought it would be necessary to impose a limitation in every case, because as a general rule the fact that the consumer would only pay for the number of heat units he received would be a sufficient guarantee that the undertakers would not put themselves to the unnecessary expense of distributing at their own cost an excessive proportion of incombustible gas. However, as a result of the discussion on this question in the House of Commons Committee, it was felt that the divergence of opinion among experts was so great that it would be desirable to deal with the matter by providing for further inquiry, and subsequently (if found necessary) by making a Special Order imposing any limitation that might be required in the proportion of incombustible constituents in the gas. A further question that had been brought to the attention of the Board of Trade was as to the necessity of placing some limitation on the proportion of carbon monoxide in the gas. Opinions on this question were much divided; and it was accordingly proposed to deal with it in the same manner as the question of inerts. The new method of charge would make the testing of gas a matter of first importance in the interests of the consumer; and it is proposed by the Bill to apply to the whole country the system which had worked well in London for a number of years. Under it the situation of the testing-places, the apparatus to be provided, and the mode of carrying out the tests were prescribed by the three Gas Referees appointed by the Board of Trade; and the reports of the gas examiners appointed by the local authorities to test the gas were adjudicated upon, if necessary, by an independent Chief Gas Examiner appointed by the Board of Trade. The remuneration and expenses incurred were recoverable by the Board of Trade from the London gas companies; and it was proposed by clause 7 of the Bill to apply the same principle to the officers to be appointed in future by a levy upon the gas undertakings which would not exceed 3s. for each million cubic feet of gas supplied. As to clause 9 of the Bill, by which the penalty for failure to supply the declared calorific value of the gas was made more stringent than under present conditions, he might point out that the object was not to penalize the undertakers for occasional failures to comply with their statutory requirements, but rather to induce them to supply gas fully equal to the declared calorific value, and of as constant a quality as practicable. By clause 10 the Board of Trade would have power to make Special Orders for the same purposes as those for which Provisional Orders could be made under the Gas and Water Works Facilities Act, 1870, and for the other purposes named in the clause—including power to authorize the obtaining of supplies of gas in bulk from any available source (such as coke-ovens), the provision of separate supplies of gas for industrial purposes, and arrangements for the joint working and amalgamation of undertakings. The powers to authorize superannuation and pension funds, and the redemption of obsolete capital, were introduced into the Bill by the House of Commons' Committee. The procedure proposed by this clause had been adopted in several recent Acts of Parliament—notably the Electricity Supply Act of last year; and it offered a simple and satisfactory means of obtaining additional powers without unnecessary formality, while preserving parliamentary control. It was proposed that before any Special Order could come into force, it must be laid before both Houses of Parliament for not less than twenty-one days. Full provision was made in the schedule of the Bill for public notices of applications for Special Orders, for the consideration by the Board of Trade of objections made to them, and for the holding of inquiries (if necessary) before an Order was made. Clauses 11 and 12 dealt with the testing of meters, and would enable the Board of Trade to authorize an increase of fees charged by the local authorities by whom the testing was carried out, and to make regulations for the testing of meters in lieu of those prescribed by the Sale of Gas Act, 1859.

The motion "That the Bill be now read a second time" was then put and agreed to; and the Bill was committed to a Committee of the Whole House.

HOUSE OF LORDS.

Progress of Bills.

The Ministry of Health Provisional Order (Gas) Bill was read a second time, and committed.

The Brighton and Hove Gas Bill and the Southend-on-Sea Gas Bill were brought from the Commons, read the first time, and referred to the Examiners.

The Gas Provisional Orders Bill was read the third time, and passed.

The Gas Regulation Bill was read a second time, and committed to a Committee of the Whole House for to-morrow [Thursday].

HOUSE OF COMMONS.

Progress of Bills.

A petition has been presented by the Rhymney and Aber Valleys Gas and Water Company against the Merthyr Tydfil Corporation Bill.

The Corporation of London and the London County Council withdrew their petitions against the South Metropolitan Gas Bill.

The Brighton and Hove Gas Bill and the Southend-on-Sea Gas Bill were read the third time, and passed.

The South Metropolitan Gas Bill was reported, with amendments.

The London County Council have withdrawn their petition against the South Suburban Gas Bill.

Public Utility Companies (Capital Issues) Act.

Copies were presented of reports upon applications to the Board of Trade under the Public Utility Companies (Capital Issues) Act by the Gorleston and Southtown Gas Company, the King's Lynn Gas Company, the Stamford and St. Martin's (Stamford Baron) Gas, Light, and Coke Company, the Thirsk Gas Company, and the Wexford Gas Consumers' Company, Ltd.

GAS PROVISIONAL ORDERS.

The Gas Provisional Orders (Confirmation) Bill promoted by the Board of Trade in respect of a number of company gas undertakings, was sent forward by the Unopposed Bills Committee of the House of Lords on Tuesday of last week.

SOUTH METROPOLITAN GAS BILL.

The South Metropolitan Gas Bill was before the Unopposed Bills Committee of the House of Commons on Thursday last—Sir E. CORNWALL (the Deputy-Chairman of Ways and Means) presiding.

Mr. SEAGAR BERRY (Messrs. Sherwood & Co., Parliamentary Agents) said the Bill had already passed the House of Lords (see "JOURNAL" for May 11, pp. 322, 387). Dealing with the financial proposals of the Bill, he said that the returns on capital had never reached 5 p.ct. In the other House, the Chairman of the Company stated that he had invested in the Company for 24 years, and had never received 5 p.ct. on his investment. In the House of Lords, the London County Council and the City Corporation, as well as the eight Borough Councils in whose districts the Company supplied, and who had special powers to look after the interests of the consumers, petitioned against the Bill. After a very long and close hearing, during which the London County Council brought their own staff and some outside experts, several important amendments were made which, with some minor adjustments, subsequently gave the opposition all that they wanted. All the authorities who petitioned in the other house were now satisfied; and he thought it could be said that the consumers' interests had been looked after. The Bill occupied four days in the House of Lords.

The CHAIRMAN: It was very thoroughly gone into in the House of Lords, and this important opposition has been withdrawn?

Mr. BERRY said that was the position. Continuing, he said the Bill was divided into two parts—one dealing with the heat-unit basis.

The CHAIRMAN said that as the main opposition had been withdrawn, and the Committee had been satisfied that the consumers' interests had been looked after, he did not think this Committee need go into the details of the measure. As it took several days in the House of Lords, it would take several days for this Committee to go into all the matters dealt with.

Mr. BERRY said all bodies representing the public were heard by the House of Lords, and were now satisfied.

Sir ERNEST MOON, K.C. (Speakers' Counsel) asked how the proposals made in the Bill compared with those in the Gas Regulation Bill with regard to the heat-unit basis. Was it more favourable for the Company, or had this to be determined?

Mr. BERRY thought that it had yet to be determined. The Company's Bill placed an obligation upon them to carry out what was known as the Standards Agreement arrived at between the local authorities, companies, and the Fuel Research Board, who had reported that gas ought to be sold on a heat-unit basis. Moreover, the Company had, at the request of the Board of Trade, put in a new clause (15a), which stated that any provisions of any Public Act passed in this session of Parliament should apply to the Company as regards testing and penalties. The object of the Board of Trade was that the provisions with regard to testing, &c., should be the same in the case of the three large London companies. Further, the Company had bound themselves, under their Bill, to pay into the fund to be provided under the Gas Regulation Bill to meet the salaries and expenses of the Chief Gas Examiner and other officials.

Sir ERNEST MOON mentioned that, under the Gas Regulation Bill, the standard price was hereafter to be determined in each case.

Mr. BERRY said that was so. In the case of the Company, the London County Council were satisfied that the standard price was quite fair. What they objected to was the original proposal of the Company with regard to dividend—viz., that all shareholders, old and new, should receive the basic dividend of 6 p.ct. The London County Council said the standard price of 11d. was fair, and that the 6 p.ct. in the case of new capital was also fair. They also agreed that the existing shareholders should have some amelioration, but that it was too big an improvement to go from 4 p.ct. to 6 p.ct. The Committee eventually gave 5 p.ct.

The CHAIRMAN: So that the Board of Trade, who reported so strongly against the Bill originally, now agree, and you have nothing outstanding with them?

Mr. BERRY: That is so.

Dr. *Charles Carpenter* then proved the preamble of the Bill; and it was ordered to be reported for third reading.

LURGAN GAS.

Local Government (Ireland) Provisional Order (No. 3) Confirmation Bill was ordered to be reported for third reading by the Unopposed Bills Committee of the House of Commons on Thursday last. The Bill authorizes the Lurgan Urban District Council to increase the maximum price for gas from 4s. 6d. to 7s. 6d. per 1000 c.ft. It was explained that the Council made a loss of £2000 last year.

PONTYPRIDD GAS BILL.

The Bill promoted by the Pontypridd Urban District Council was on Tuesday of last week sent forward for third reading by the Unopposed Bills Committee of the House of Lords. The gas portion of the Bill includes powers to increase the standard price to 5s. 6d., to purchase and supply coke-oven gas for power purposes, to vary the price according to the purpose for which gas is used (without, however, giving preference to consumers using gas for the same purpose), and to supply gas in bulk.

TREDEGAR GAS BILL.

The Tredegar Urban District Council Bill, which, among other things, provides for an increase of the standard price to 8s., and for the supply of coke-oven gas, was sent forward by the Unopposed Bills Committee of the House of Lords on Tuesday of last week. The Bill has already passed through the House of Commons.

MISCELLANEOUS NEWS.

PRESENTATION TO THE ENGINEER OF THE DUBLIN GAS COMPANY.

Mr. Harry Dumbleton, who had been General Works Manager to the Alliance and Dublin Consumers Gas Company, has recently been appointed to the position of Chief Engineer, owing to the retirement of Mr. William Newbigging, M.Inst.C.E.; and the men employed at the works, Great Brunswick Street, marked their appreciation of the event on Wednesday evening last, when they presented a valuable antique silver salver and an illuminated address to Mr. Dumbleton, and a handsome silver bag to Mrs. Dumbleton. The ceremony took place in the works board room, where the employees' representatives met Mr. Dumbleton and the Directors.

Mr. P. FORDE, in making the presentation, dwelt on the qualities of honourable dealing and straightforwardness which has characterized all Mr. Dumbleton's dealings with the men under his control. The men desired the gift to be regarded by the Engineer as a lasting testimonial of their esteem. The only regret they felt was the loss of Mr. Newbigging; and they trusted that the Directors would see that his connection with the undertaking would not be severed. Death had already deprived them recently of two friends, in the persons of Mr. John Edward Fottrell and Mr. John L. Scallan. They were glad that Mr. Fottrell's place on the Board had been filled by Mr. Jeremiah MacVeigh, M.P., whose presence at the meeting was very cordially welcomed.

Mr. DUMBLETON briefly responded, and paid a tribute to the loyal support accorded him by all sections of the workers at all times. Much as he prized their beautiful gift, he said he appreciated far more the manner of the giving.

Mr. AUGUSTINE BOND (in the unavoidable absence of the Chairman, Mr. John Murphy) conveyed the congratulations of the Board to Mr. Dumbleton, whose devotion to the interests of the Company had won his promotion. In pleasing the Directors, and winning the esteem of the employees, he had achieved the happy position which should be the ambition of all who would hold the balance between Capital and Labour.

Mr. F. J. DICKENS, in the course of some congratulatory remarks, said he was glad to assure those present that the Board had arranged that the Company would not lose the valuable guidance and assistance of Mr. Newbigging.

Messrs. NEWBIGGING, DAVIS, MACVEIGH, and GREY also having spoken,

A pleasant entertainment followed, at which Mr. Dickens, in proposing the toast of "Ireland," said that the object of himself and his co-Directors from Manchester was to place the Dublin Gas Company in the front rank of gas undertakings. He regarded the present gathering as a symbol of what could be done for the country at large, if straightforward men met together in friendship. Mr. Forde, in responding, remarked that if Mr. Lloyd George had selected Manchester men for his cabinet, the Irish question would be settled in a few hours.

NUMEROUS UNAUTHORIZED GAS STRIKES.

Manchester and Other Big Towns Affected.

Late last Wednesday night, there was a sudden and unauthorized strike of 1200 men employed at the three manufacturing stations of the Manchester Corporation Gas Department, in repudiation of the previous day's national settlement of the wages dispute; and their unfortunate example was promptly followed by the workers in Salford, Bury, Radcliffe, and Stockport. The gas officials in Manchester were naturally taken by surprise; but efforts were at once made to conserve supplies by reducing the pressure for domestic purposes and cutting-off industrial power users. By 5 o'clock on the Thursday evening, it was estimated that only half-a-day's normal supply of gas remained available. Attempts that night to arrange a settlement failed. Every man at the different stations had come out. Many works were compelled to at once close-down; while much inconvenience was felt in hotels, restaurants, and private houses. Streets not lit by electric lamps were left in darkness.

At noon on Thursday, the Manchester Gas Department issued the following notice:

> Owing to the unofficial strike of gas workers in Manchester on Wednesday night, the manufacture of gas has ceased, and the pressure of gas has been greatly reduced. It is therefore absolutely essential that consumers shall see that the gas-taps on their premises are securely turned off at once, and kept off until such time as the normal supply is resumed. Failure to observe this precaution may result in serious accidents.

Saturday's news was that the Manchester men, after a three-hours' mass meeting, decided not to return to work, though it was suggested that if they did so a ballot on the ratification or rejection of the national settlement might be arranged, with a possible re-opening of negotiations. All Friday men were out turning-off the supplies at street-valves, so as to prevent consumers causing mischief by drawing upon the depleted mains. The hospitals of the city naturally suffered severely. It was not possible to provide the patients with their proper invalid diet at the Manchester Royal Infirmary; the kitchen staff being only able to supply boiled and steamed foods. An official statement was made that the hardships to the patients could not be too strongly emphasized. In the pathological laboratories work was brought to a standstill, and the distillation of water used in the wards

and operating theatres was very difficult. At St. Mary's Hospital for Women, there were only cold meals except for the babies and the more serious of the adult cases, among whom a limited supply of soup was distributed. Urgent operations were performed in spite of the difficulties; but slight ones were postponed.

The men at Salford came out on Thursday night, in spite of strenuous efforts by officials of the National Union of General Workers to restrain them. Originally they had intended to come out at 2 o'clock in the afternoon; but they agreed to defer action pending an interview with the Chairman of the Gas Committee. This interview failed of its intention, which was to reach some sort of understanding which would have prevented a strike. Mr. Fleming Eccles (the District Secretary of the Union) was not aware of what had happened till he arrived in Manchester from London on Thursday afternoon. It was then too late for him to do anything which would have any immediate effect on the situation in Manchester; but he went to Salford, where he addressed a meeting of the men, endeavouring to persuade them to remain at work at least until the Union could properly review the situation.

The number of small firms compelled to cease work on account of the strike was largely increased on Saturday; and workpeople made idle against their wills probably number some hundreds of thousands. Those departments of engineering works and factories that depend on gas for their motive power have since been closed each day in greater numbers.

The staffs in both the Manchester and Salford Gas-Works were doing all they could to keep the fires alight in the furnaces. Some of the fires were out, nevertheless; and the contraction caused by cooling has cracked the retorts. As a result, the normal production of gas whenever work is resumed will be slightly lessened for some time, although the gas supply of the area is not likely to be very appreciably affected.

A mass meeting of Salford strikers on Saturday morning asked the Mayor to receive a deputation, and he did so; while the Town Clerk also met Mr. Fleming Eccles and Mr. J. Williams (the Chairman of the North-West Regional Council). At a mass meeting of Manchester and Salford strikers a more conciliatory tone was adopted. Mr. Williams urged the strikers to act on the advice given by Mr. J. R. Clynes, M.P., in the following message, which had been received and circulated among the disaffected branches earlier in the day:

> I hope that the men will now regard the strike as a protest made under provocation, and, having made their protest, they will at once resume work without pressure from any quarter, and ask their representatives to continue negotiations. I suggest that a few additional representatives be appointed by the men to act in any further conference with the employers which we may be able to convene, to discuss questions not yet settled to the men's satisfaction. I am satisfied that the men cannot procure any better terms by unauthorized stoppages; and they can only secure trade union and public support by acting for the time being according to the terms arranged on their behalf by the appointed representatives. By remaining out now, the men will lose more than the margin of gain between the present concessions and their demands.

He (Mr. Williams) was prepared to write out his resignation and put it on the table, as a guarantee that the employers would review the position during the next seven days. In the evening the officials made an effort to get the strikers to understand more clearly the improved conditions which the disputed agreement has won for them, by sending round to all branches in the disaffected areas a detailed explanation of the terms of the agreement. A covering letter pointed out that the settlement, for the first time in trade union history, fixed uniform minimum conditions for gas workers, and asked the men not to take any steps likely to retard further progress or reduce the effectiveness of their organization.

Mr. Williams's request for an immediate meeting of the North-West Regional Council was considered on Saturday evening by the Lancashire and Cheshire District Management Committee of the Federation of Gas Employers, whose members had been summoned by wire. The meeting decided unanimously that, before negotiations could be opened, the men on strike must accept the advice of their leaders and return to work. "The meeting was also unanimous," continued the official statement that was issued, "that it was utterly hopeless to carry on negotiations and arrive at agreements unless both sides were willing to carry out the agreements. If the gas workers want to reopen discussion, let them show that they are willing to play the game and resume work at once."

Mr. Clynes arrived in Manchester on Monday, to endeavour to secure a resumption of work by the strikers. On this day the Manchester strikers had held a mass meeting, at which none of the union officials was present; and the decision to remain on strike until the full demands were conceded was unanimously reaffirmed.

The Salford gas-workers, at a mass meeting held in the morning, resolved to ask him for a written guarantee that if the strikers returned to work immediately, their demands should be put before the Regional Council and a decision reached within seven days; but Mr. Clynes could not give them the guarantee. In view of the employers' refusal to re-open negotiations while the strike continued, he said, the strikers would serve their own interests best by resuming work at once, and asking their leaders to press the demands not yet conceded. The question referred to was put to Mr. Clynes at a conference in the Manchester Town Hall, to which he had invited representatives of the gas-workers of Manchester, Salford, Stockport, Radcliffe, Bury, Oldham, and Rochdale. The conference lasted from 7 p.m. to 9.45 p.m.; but some time before it ended some of the more intractable delegates, representing Manchester and Bury, left the meeting as a protest against the reiterated appeals from Mr. Clynes and other officials of the union for an immediate resumption of work. They considered that they were not entitled to vote on such a question, because the men they represented had empowered them to do nothing beyond insist on their claim being fully met. They suggested that the right procedure was for the Regional Council to meet the Central Strike Committee, representing the strikers of all the towns, and arrange terms of settlement before work was resumed.

MR. CLYNES ON THE SITUATION.

The following account of an interview by a London Correspondent with Mr. J. R. Clynes, M.P., appeared in Saturday's issue of the "Manchester Guardian."

When the National Conference of Gas-Workers last week accepted terms and decided to withdraw notices, it was generally believed by the men's leaders that strikes would occur in some of the centres. To-day I had an interview with Mr. Clynes, M.P. (the President of the National Union of General Workers), Mr. J. O'Grady (the Secretary), and Mr. Eddy, M.P. (the Vice-President), who asked Mr. Clynes to act as spokesman. The following, therefore, may be taken as the agreed opinion and message of the three.

"First I would say," said Mr. Clynes, "that we view with the greatest regret the stoppage of work in Manchester or any other centre. The stoppage is an act of revolt against trade unions which have done their level best in the men's interest. It is not a strike against the employers so much as a desertion of trade union methods. It should be said, however, that the unrest of the workmen has been developed to a great extent by the unreasonableness exhibited by the employers when we first approached them many weeks ago to consider the claims for an advance and to settle, if possible, by means of negotiation.

"The employers rejected every demand for the advance in wages. They did offer some slight advance on the minor claims relating to annual holidays, week-end work, and overtime. But on the main point of the demand they met us with a blank refusal. Proceeding from that, a ballot of the men all over the country was taken. By an overwhelming majority the men required us to press forward their claim. We did so. The employers then met us; and after a number of conferences, terms were finally secured which were submitted to a representative conference convened to act for the workmen over the whole of the country.

"This conference felt it was empowered to come to terms with the employers after having first refused terms which were quite unacceptable, but after having eventually secured the utmost amount of concessions which we thought could be extracted by any process of negotiation. The conference did not believe it was in the men's interest to advise a strike, or that at present any better concessions could be secured by any other action. Having done that, after many weeks of effort on the men's behalf, the conference, it is certain, is disabled from giving any support or encouragement to discontinue work in the few cases where stoppages have occurred.

"We should always fight for employers recognizing the decisions of trade unions, and are now entitled to ask the men to recognize the decisions of trade union representatives when they are reached in their interest. The settlement reached at the conference secures minimum conditions for gas-workers all over the country, and, being of a national character, confers very great benefits on men who are lowest down in the scale; while it in no way prevents the unions in due course from taking still further steps to improve the conditions of the better organized men in the big centres.

"While the amount of wage advance must be the same in all parts of the country, the settlement reached at the recent conference would permit of still further improvements with respect to annual holidays and week-end rates being the subject of mutual arrangement and settlement as between the unions in the different centres and the representatives of the municipal bodies or gas companies, and, indeed, for that purpose the negotiating committee was asked still to remain in session.

"Let me finally say that our efforts will be greatly hampered, and the men's permanent interests endangered, by occasional stoppages. We regard the gas-workers as a splendid body of men who have set a great example to other trade unionists; and we hope they will not spoil their future prospects by sudden and unauthorized stoppages at a time when their accredited representatives are doing everything on their behalf."

NEWS FROM OTHER TOWNS.

The employees at Bury held a meeting during the dinner-hour on Thursday, and intimated to the management that the night shift would not go on duty at 10 o'clock; the yard hands ceasing at 5.30. Endeavours were made to avert a stoppage, but without success.

The men employed by the Radcliffe Gas Company did not resume work that day, except the firemen—dissatisfaction being felt at the award. The pressure of gas was promptly reduced.

During the early part of Thursday the gas workers at Stockport agreed to continue at work, while protesting against the terms of settlement. Later, however, another meeting was held, when it was decided to strike; and the night shift did not go on as usual at 10 o'clock. The terms of settlement were strongly condemned; and the action of the officers of the Union in agreeing to them without first consulting the workers was severely commented upon. It was resolved not to return to work until the claims had been conceded in full. About 500 men are affected by the strike. The refusal of the men to allow a small staff to attend to the furnaces created much resentment against them in the town.

At Oldham a different method was chosen of expressing dissatisfaction at the turn of events. Here the men decided not to pay any further union contributions until they receive an explanation of the action of their officials in accepting such terms of settlement. Later, not content with this decision, they refused to admit an official of the union to a meeting. They then decided to go on strike; and the Friday night shift did not commence duty. On Sunday, the men decided to resume work again immediately, on condition that the leaders reopen negotiations, and that representatives from the works be appointed to act together with the officials in these negotiations.

On Friday, the strike fever spread to a number of other towns. At Wigan, the afternoon shift did not go in; but after the Mayor (Mr. Walkden) had personally addressed the men at the works, and told them that every member of the Gas Committee was of the opinion that the award was insufficient so far as the North was concerned, and had promised to get in touch with the Federation of Gas Employers so as to see if the award could be amended, they returned to work.

The Bristol Gas Company's employees to the number of 800

declared a strike on Friday, and at a meeting refused by an overwhelming majority to re-open negotiations. The production of gas entirely ceased at noon on Sunday, when the Gas Company, having almost emptied their holders, shut-off further supplies. Serious industrial results are threatened. One large engineering firm, employing 1500 hands, announced that they would close-down on Tuesday. By a notice in the local press, consumers were cautioned to see that the main taps at the meters and all gas-taps on their premises were securely turned off at once, and kept off until such time as normal conditions are resumed. The public are taking the strike quite calmly. They are utterly out of sympathy with the strikers; but they are going about making the best of the inconvenience in the right spirit. In a Clifton nursing home on Sunday, it suddenly became necessary to perform a critical operation upon a patient. Hot water was essential for the use of the surgeons. The failure of the gas supply entailed very serious delay in its provision; and the life of the sufferer was much endangered.

A strike was also determined upon at Stoke and Fenton; but Mr. A. Mackay, the Stoke-on-Trent Gas Engineer, met the men on Saturday morning, and persuaded them to return to work in the afternoon, on the understanding that a week's notice should be given, and that, in the meantime, negotiations with the National Federation of Gas Employers should be opened-up. Mr. Mackay said that if the Employers' Federation refused to reconsider the workers' claims, he would ask his Committee to deal with the local situation on its merits. In Stoke, Fenton, and Longton, the men were absent from work for twenty-four hours; but at Burslem the strike lasted only during Saturday forenoon. Altogether it was calculated that the men who had obeyed the strike call up to 5 o'clock on Friday afternoon numbered about 6500.

After a strike extending from Friday the men employed at the Heywood Corporation Gas-Works on Monday agreed to resume work. The end of the strike came just in time to prevent a complete stoppage of supplies, as the stocks available had been almost exhausted. The men resumed work on the understanding that if better terms are granted after negotiations they will be paid at Heywood.

At Blackburn the workmen employed in the Corporation Gas Department had a meeting on Friday, and intimated their intention to come out on strike on the following day, at 10 p.m., to enforce the full terms recently demanded. Mr. Clynes sent a long wire deprecating the action of unauthorized strikers, and pointing out that they prejudiced negotiations. On Saturday strong appeals were made for the men to remain at work; and, after two hours' deliberation, the employees decided, by a narrow majority, to stay at their posts. The Union officials undertook to work for the concessions asked for.

The strike at Denton did not last long. The men downed tools on Friday afternoon, and on Friday evening they met the Gas Committee, but decided to stay out for 8d. per day above the terms of the agreement. On Saturday morning the men met in general meeting, and were addressed by their Secretary (Mr. J. Birch) and Mr. F. Cooke (Secretary of the Trades and Labour Council), who explained the national settlement. Mr. Cooke promised to bring their grievances before the Gas Committee, and what the Manchester men obtained he promised they also should receive. On this understanding, the men took a vote, and unanimously decided to return to work at 2 o'clock that afternoon.

The Rochdale gas workers came out at 10 o'clock on Saturday night. It was thought that the strike was likely to be short.

The Huddersfield gas workers, to the number of 350 men, ceased work at 2 o'clock on Saturday, in accordance with the notices which had been handed in the previous Thursday. The men demand the full 10s. originally asked for; but the Corporation Gas Committee have decided to adhere to the national award. The Committee, however, promised to make a recommendation to the Employers' Federation—in view of the wages being paid in the building trades—that the application for 10s. should be granted in place of the 6s. This offer proved of no avail; and the men came out. The Committee had stated that, should any man withdraw his labour, it would be deemed that he had left the employ of the Corporation, and his insurance card would be returned to him. The whole of the employees, however, have not struck work—those employed in the distribution and engineering sections decided to continue work under protest. At a mass meeting on Saturday, a telegram was read ordering the men to remain at work and to loyally accept the national settlement. There was some criticism levied at the notice issued by the Gas Committee as to the men withdrawing their labour, and thereby being considered dismissed from the Corporation service. The action of the strikers in going against the wishes of their leaders has been the subject of a great deal of adverse comment; and the leaders themselves would seem to have lost all control of the men. By Monday the strike had thrown about 1000 people out of employment.

At about noon on Saturday, the workers at Weston-super-Mare decided to "down tools;" and they carried this decision into effect the same day, despite the well-known fact that a big minority of the men were against such a drastic step. Not one gas worker—members of the General Workers' Union—remained at the works on Saturday night after 10 o'clock; but at that time, fortunately, the holders were well filled. Mr. J. Taylor (the Engineer), interviewed on Sunday, said he had already got the water-gas plant at work, and gas was being made. A limited supply would be maintained. Many offers of voluntary help had been received—more than could be utilized. In addition, all the technical and office staff had volunteered to render help.

At Bradford, the gas workers are far from satisfied with the terms of the national award. A meeting of the Bradford branch of the National Union of General Workers held on Friday night last unanimously passed a resolution—"That we send an application to the City Council asking for 4s. increase in wages, to date back to May 1." It is stated that, so far as the holiday question is concerned, the Bradford gas-workers are in a more favourable position than that granted by the national award—viz., seven days with pay. There are 1000 men in the employ of the Bradford Corporation who are affected by the award. No untoward developments are anticipated here. A further meeting of the men takes place to-day to deal with the situation.

A meeting of Preston gas workers was held last Thursday to discuss the national agreement. By a unanimous vote, the settlement was accepted, with a protest against the limited concessions on holiday and overtime claims. The officials of the union were instructed to re-open these questions at the earliest opportunity.

The gas workers in Birmingham decided, at a Town Hall meeting presided over by Mr. Eldred Hallas, M.P., on Friday night, to accept the offer of the employers of an increase in wages of 1s. per day, or per shift, together with the concessions as to holidays and overtime rates. Alderman Simpson, the Joint Secretary of the Gas Workers, and Mr. Luckman, urged the acceptance of the offer made by the Corporation Committee, and stated that earlier in the day the Workmen's Executive had agreed to recommend the adoption of this course. The meeting was somewhat stormy; there being a limited number of men who expressed the view that their original demand of 10s. a week increase should be insisted upon. A resolution accepting the offer, under protest, was carried; and the officials were instructed to notify the Gas Department of the discontent existing among the men, and to take steps in the hope of inducing the Department to increase their offer to the amount originally demanded.

At a meeting of the gas workers of the Ashton-under-Lyne district on Saturday, the majority of the men were opposed to adopting the strike weapon to secure their demands. The position was summed-up by one of them, who said: "We are wholly dissatisfied with the terms of the national award; but in view of the fact that the settlement was negotiated by the union, most of us feel that constitutional action should be taken to secure reconsideration."

Plymouth gas workers at a mass meeting on Sunday decided to request an immediate conference of the rank-and-file of all unions concerned to re-open negotiations, with a view to securing the granting of their original demands. Failing this, and in the event of no settlement being reached, another meeting is to be called next Sunday, to decide the question of withdrawing labour the following day.

The employees at Briton Ferry have decided to resume work.

HEREFORD REFUSES AN ADVANCE.

The Hereford City Council on Tuesday of last week unanimously resolved to stand firm against the demand of the gas-workers for an increase in pay. The main reason is that the gas-works are run at a loss, and that the price of gas is at its legal maximum. Labour and independent members gave a lead in this attempt to "break the vicious circle of rising prices."

Alderman Witts, as Chairman of the Gas Committee, first of all read a *résumé* of an address he had given to the men explaining the financial position of the works, so that they should understand that the undertaking could not possibly meet their demand. "No one can accuse me of being unsympathetic to Labour," he said, before reminding them that there was a deficit of £4500 on the works last year. Further, there was not only at the present moment an overdraft on the bank, but their revenue account had fallen from £11,200 to £6734. The Committee felt that they had no more money to give, because they had paid to the last penny. If the workers contended that the price of gas should be advanced still further, he would inform them that the price had now been raised to 6s. per 1000 c.ft., which was the maximum fixed by their Act. After an appeal to the men's "sense of common fairness," he reminded them that there were some 500 unemployed in Hereford, which number would be increased to 600 if they came out on strike. The Committee could not agree to the recommendation of the Joint National Conference to advance wages by 6s. per week. He admitted that the majority of the gas undertakings belonging to the National Federation agreed to abide by the decision of this body. It was all very well for undertakings in large industrial areas to pay an extra 1s. per shift, but in Hereford, where they were a great distance away from the gas-coal fields, freightage was very heavy, and they had no surplus funds at their disposal. The workers in the gas undertaking were earning 58s. to £4 a week; and if they came out, they would be forcing a fight.

Mr. Allcock (who was one of the speakers in the debate) said that, as a member of the Gas Committee, and also a Labour representative, he was in an unenviable position; but he wished to state publicly that he was quite in agreement with the Gas Committee's decision. After weighing the position, he told the Committee that someone had got to make a start in the breaking of the vicious circle. He was more concerned with bringing prices down than with raising wages with the object of catching-up prices. They, as workers, were beginning to realize that, while with one hand they got 1s. rise, they had to pay out an extra 1s. 3d. with the other. The attitude he had adopted would not, perhaps, be a popular one with the men at the gas-works, and possibly with a good many of his fellow-trade unionists. At the same time, he would not be a party to the continuance of the vicious circle of rising wages and prices. He wanted the men at the gas-works and others to bear in mind that as long as they continued to ask for wages to go up, they were parties to the increases in prices.

Later reports were to the effect that the Gas Committee were standing firm in their resolve not to grant any further increase in the men's demands, in spite of the national award. They feel that the ratepayers cannot bear any more burdens in this direction.

Stafford Gas Official's Salary.—Alderman Mycock moved, at a meeting of Stafford Town Council, that the bonus paid to Mr. S. Caulfield (who has been an official in the Gas Department for 22 years), in pursuance of the Council's order of March 9 last, be reduced by £100 per annum, so as to bring his salary into line with those of the other clerks employed by the Department. Alderman Westhead (the Chairman of the Gas Committee) said that if the resolution was carried it would be considered one of the most disgraceful things that the Corporation could be guilty of. Ultimately the resolution was rejected, and a motion to refer the matter to the Salaries and Wages Committee was carried by 15 votes to 9.

WELSBACH LIGHT COMPANY, LTD.

The Ordinary General Meeting of the Welsbach Light Company was held last Wednesday, at Winchester House, Old Broad Street, E.C.—Mr. J. R. YATES in the chair.

The SECRETARY (Mr. E. J. Butcher) read the notice of meeting, and the Directors' report and the accounts were taken as read.

DIFFICULTIES BUT PROGRESS.

The CHAIRMAN said in the report and accounts would be found recorded the results of another year's work on behalf of the shareholders. Twenty months after the armistice, they were still more or less in the stage of building-up and reconstruction. He reminded them last year that alterations and extensions at the factory were overdue, and were then in hand. Long before now they should normally have been completed and in use; but owing to the extraordinary difficulty in building operations to-day, they were only approaching completion. Notwithstanding these and other hindrances, the Board had managed to maintain the mantle business (the Welsbach mantle still held its pre-eminence), while in other directions they had expanded their trade in lighting and heating accessories—thus producing the improved results reflected in the accounts. In connection with the factory, they had done and were doing everything possible to make the conditions there convenient for the workers, and conducive to good work. The Directors had endeavoured—and he thought successfully—to maintain the satisfactory relations which had been customary between the Company and those in their employ.

DESTRUCTIVE TENDENCY OF THE EXCESS PROFITS DUTY.

The favourable outlook which the Board had worked to attain was affected by two matters referred to in the forefront of the report, one of which was the continuance of the tax known as the E.P.D. This might have been admissible as a temporary expedient; but as a continuous policy it was likely to be destructive of itself and of the industry on which it was imposed. A form of taxation which encouraged slackness, induced waste, and checked production at a time when production was most needed, stood universally condemned.

A "KEY" INDUSTRY AND DUMPING.

The second point was the delay in fulfilling pledges given for the safeguarding of "key" industries and the prevention of dumping. It would be remembered that in the Bill promoted by the Government last autumn an endeavour was made to safeguard industries adversely affected by the depreciation of foreign currency and "key" industries—including their own. Inasmuch as it was included in the schedule to the Bill, he need not now labour the point as to the right of mantle manufacture to be considered a "key" industry. Suffice it to recall the well-established fact that the mantle meant an immense saving in the utilization of gas, equal to many million tons of coal a year. It had thus conserved throughout the war, and continued to do so, vast quantities of this valued national asset. In wages, direct and indirect, very large sums were drawn from the industry. Before the war the industry was dominated from abroad; and if they were again to have dumped into this country mantles produced under conditions very different from those prevailing here, numbers of British workers would be thrown out of employment, and the "key" industry they had helped to build-up would be seriously affected. Subject to these remarks, the prospects for the present year might be considered satisfactory.

FINANCIAL RESULTS.

Turning to the profit and loss account, the gross profit on trading, with the income from the associated companies (including B. Cars, Ltd.) amounted to £94,495, against two items in last year's account, which aggregated £73,474. It was not expedient to announce in detail the working of the business. On the other side of the account, depreciation and loss on realization of Government securities—£5132—the Board regretted; but they did not apologize for it. With general approval, they responded amply to the financial invitations of the Treasury throughout the war and after, but with the eventual loss which had now become too familiar to most of them. Other items were next referred to. The net profit was £61,688, which, added to £17,765 brought forward from last year, made a total of £79,453. They could only give an estimate of their liability for excess profits duty for last year, for which they had been advised to make a provision of £12,000. This left £67,453, as to the appropriation of which he would refer later. The share capital stood at March 31 last at £256,422, of which £81,422 represented the applications made for the recently issued shares. Subsequently to March 31 a further 1503 shares were applied for by belated shareholders, and allotted and fully paid—many of these coming from shareholders who were serving abroad. They still had a balance in hand of 7075 shares. Inquiries had been made from shareholders as to what the Board were going to do with them, and whether they were going to issue them among the shareholders. Having regard to the necessity for the closing of the books, advertising, issuing circulars, application forms, allotment letters and renunciation forms, and then, having a lot left over afterwards, at very considerable expense, the Board had decided for the present to allow the shares to remain in the hands of the Company and at the disposal of the Directors, to be dealt with, if and when occasion should arise, in the best interests of the Company. Debenture stock had been reduced to £94,723. Having regard to the award referred to in the last report, the excess profits duty liability had been worked out during the year, with the ultimate result that they liquidated the amount due up to March 31, 1919, by paying £53,151, and the balance of £25,124 over-provided was added to the general reserve, which now stood at £60,124. The reserve for Inland Revenue taxation, £25,000, it was considered prudent to retain intact for the present. On the other side of the balance-sheet, goodwill, patents and patent rights remained at the low figure of £7304. Freehold and leasehold properties, plant, furniture, and fixtures stood at £93,233, as against last year's aggregate of £88,838. The difference was due to additions on the one hand and depreciation on the other. Sundry debtors were £98,025, as against £60,633—an increase which reflected the condition of trade. Stock-in-trade at £105,388 was somewhat down. Investments, £20,000 of War Loan, had been sold during the year, and the proceeds applied in redemption of debenture stock under the scheme of December, 1916, except as to £5099 on deposit in the name of the Trustees for the debenture stockholders. Consols to the amount of £20,000 had been sold by the Trustees, and the proceeds applied in improvements and extensions of the property. The proceeds of the shares issued last March, with other funds, were invested in £100,000 (nominal) of Treasury Bills, while the cash at the bankers, on deposit and current account, and in hand amounted to £50,624.

THE APPROPRIATION.

Regarding the appropriation, the Directors proposed to wholly wipe off the balance of the underwriting commission of 1911 and 1916—viz., £19,859. The Directors recommended a dividend of 10 p.ct. and a bonus of 5 p.ct., both less tax, on the old shares, absorbing £26,250, and leaving a balance to be carried forward of £21,343, in which connection next year there would be about 50 p.ct. more share capital to carry dividend.

THE MERCHANDISE MARKS ACT.

A matter which had in the past vitally affected the industry was the marking of imported mantles. It was the Company's experience that representations of their own trade marks and trade name had been unlawfully attached to goods imported into this country from abroad by unscrupulous dealers. Imported mantles had also been sold in this country without any clear indication of the country of origin and their foreign manufacture. In other instances, the words denoting foreign make had been erased on the boxes containing the mantles, and the boxes had been relabelled. Evidence was given on the Company's behalf before the Committee appointed by the Board of Trade to report upon alterations in the Merchandise Marks Act. The Committee had made a report; and although the recommendations fell short of what was desired, it was hoped that legislative effect would be given to them without any avoidable delay, so that when a purchaser asked for the best—that was to say, a Welsbach—mantle, he would get one which had been manufactured at their Wandsworth works, and not an imported third-rate production. Similarly, if Kern radiators were asked for, the Company desired that there should be no doubt the purchaser got the well-known radiator of that name, which had stood the test of time and competition.

PERSONAL MATTERS.

Having referred to the retirement of Mr. Lock, who did such excellent work for the Company, and whose serious and continued ill-health was greatly regretted, the Chairman said they had had the pleasure of welcoming to the Board Sir James Remnant, and subsequently Mr. Walmisley, both of whom were known to be men of wide experience, and who would, the Directors felt convinced, prove valuable additions to the Board. He also expressed his appreciation of the work of Mr. Robert Cars, the Managing Director of the associated Company, B. Cars, Ltd., of Mr. Bark, the Works Manager at Wandsworth, of the staffs at the head office, the depôts, the factory, and B. Cars, Ltd., and last, but by no means least, he particularly referred to the valued services of their colleague, the Managing Director, Mr. B. Cars. The resolution for the adoption of the report and accounts and the declaration of the dividend and bonus (as referred to earlier in the speech) was then formally moved.

Mr. B. CARS (the Managing Director) seconded the motion.

A FEW QUESTIONS AND SATISFACTORY REPLIES.

Mr. LOWRY said the Chairman had referred to the competition the Company might have from abroad. Had they experienced any competition so far? The Directors had not in any of their reports referred to the position of monazite sands. He had read in one paper that this country had now a monopoly in the sand; and if the Chairman could tell them something about this he should feel obliged. Then, with reference to the Gas Regulation Bill before Parliament, would it help them in the sale of their burners? He was told that gas might in future be supplied which would not give light, except by the aid of mantles. As to the shares the Directors were proposing to deal with as they liked, were they going to dispose of them at par or at a premium, or were they going to give them to a business firm, or to themselves, or friends?

Mr. RICE suggested that the shares should be offered to the existing shareholders.

A SHAREHOLDER asked why the Company did not advertise more. He noticed numbers of advertisements of other mantle companies.

The CHAIRMAN, in reply, said with regard to the competition from abroad there were an increasing number of mantles coming in week by week, the effect of which would no doubt in time make itself felt.

A SHAREHOLDER (intervening) said, having regard to the superiority of the Welsbach mantle, the Chairman might possibly suggest that the inferior ones would sooner or later find their own level; and they could not have an appreciable effect.

The CHAIRMAN replied that anyone who suggested that inferior articles at lower prices would not find a sale had not much experience of the way dealers acted. There were certain people who, like Trinity House, insisted on the Welsbach mantle; but numbers of other people would buy the cheapest article they could find. As to monazite sand, he believed it was true that the finest source of sand in the world was at present in the hands of a British Company, which was not the case before the war. On the other hand, there were large Brazilian deposits the rights in which were not held in this country. There was also the possibility that vast stocks of sand which had not been dealt with during the war might be held in the Central Empires. Then Mr. Lowry also referred to the Gas Bill now before Parliament. This might have a tendency to the supply of gas of different composition which would necessitate for lighting purposes the use of good mantles. The question was also raised as to the balance of the shares; and a remark was made as to allotting them to the Board or their friends. [Mr. LOWRY: I did not say you would do so.] The Board were not anticipating anything of the kind. The Company were holding them; and they would only dispose of them in the best interests of the Company, whether at a premium or at par would depend on the circum-

stances at the time. There was no intention at present of dealing with the shares at all. They did not need the money; but should such an occasion arise, the shares would be dealt with in the best interests of the Company. The Directors had carefully considered the question of offering them to the shareholders. But there was only the small amount of £7075 in £1 shares to be distributed among the holders of 175,000 £1 shares; and to offer such a small amount to the shareholders meant a lot of printing, office work, and expense. The question of advertising had not escaped the attention of the Board, who were doing the best they could in conformity with the Company's resources. They had in hand an advertising campaign which it was trusted would be both productive and useful in the Company's trading.

RE-ELECTION OF DIRECTORS AND AUDITORS.

Mr. B. Cars, Sir J. F. Remnant, Bart., M.P., and Mr. H. W. Walmisley were re-elected to their seats at the Board.

The Auditors (Messrs. Deloitte, Plender, Griffiths, & Co.) were re-appointed.

VOTE OF THANKS.

A hearty vote of thanks was passed to the Chairman and Directors and the staffs. The reply of the CHAIRMAN, on behalf of all concerned in the vote, concluded the meeting.

ANNUAL REPORT AT OSSETT.

Mr. A. E. Mottram, Engineer and Manager of the Ossett Corporation Gas Department, in his report for the year ended March 31, says that during the year 153,236,000 c.ft. of gas have been made, and 136,849,600 c.ft. sold, an increased make of 9,696,000 c.ft., and an increased sale of 6,422,900 c.ft.—bringing the unaccounted-for gas up to 10½ p.ct.

Some of this extra unaccounted-for gas is due to the Horbury River Bridge falling in and breaking a gas-main. But it is chiefly due to meters registering slow. A large number have been tested, and found to be defective in this respect; and this points to many consumers having cheaper gas than others, until the work of repair can be caught up. The greatest difficulty is to get repairs attended to, meters being held-up from three to six months.

Year ended March.	Tons of Coal Carbonized.	Cubic Feet of Gas Made.	Cubic Feet of Gas Made per Ton of Coal.
1920	10,752	153,236,000	14,251
1919	9,688	143,540,000	14,816

The gross profit for the year is £9767, and interest and sinking fund charges amount to £9748, leaving a profit on the year's working of £19. Coal has been a very heavy cost, and of worse quality than before. Residuals have realized much better prices.

GAS AND PREPAYMENT METERS AT BARROW-IN-FURNESS.

The Barrow-in-Furness Town Council last week declined to approve of a proposition that there should be a flat-rate charge for gas to ordinary and prepayment meter users, and adopted the recommendation of the Gas Committee that there should be a continuance of the old practice of charging 5d. per 1000 c.ft. more to the prepayment meter users. Alderman A. Brown, the Chairman of the Gas Committee, presented an interesting report by the Borough Treasurer, showing how the basis of the charge for gas by prepayment meters was arrived at.

The report stated that when, in March, 1899, the Corporation decided to supply gas cookers on hire, rentals were fixed as near as possible at 10 p.ct. on the actual cost of the stove—the stove to be fixed by the Corporation free of charge where the length of gas-pipe did not exceed 25 ft., and the gas to be supplied at the price then current—viz., 2s. 6d. per 1000 c.ft. At the same time it was resolved that a Davis gas-stove should be supplied with prepayment gas-meters when applied for, and fixed free of charge. The gas consumed was to be supplied at the rate of 28½ c.ft. for 1d., or equivalent to 2s. 11d. per 1000 c.ft. This difference of 5d. as between ordinary meter consumption and prepayment meters has been maintained. If a gas-stove were fixed for an ordinary consumer, the rental of 1s. 6d. per quarter would have to be paid. The prepayment consumer thus gets the use of a stove free; and taking into account the whole of the extra 5d. per 1000 c.ft. paid, he would have to consume on the average 3600 c.ft. of gas per quarter before he paid the value of the stove-rent alone. The average quarterly consumption per meter for the whole of the prepayment meters in use in the town during the last three years is:

1917-18	4900 c.ft.
18-19	5000 ,,
19-20	4800 ,,

representing 2s. per quarter over ordinary consumers—*i.e.*, 4900 c.ft. at 5d. So that there is only a margin of 6d. per meter per quarter to meet the additional cost of capital, collection, maintenance, repair, and leakage owing to more liability to the automatic mechanism going out of order.

The present extra capital cost of a three-light coin meter, as compared with an ordinary meter, is:

Coin meter, £3 15s. 0d.; ordinary meter, £2 11s. 3d.; increase, £1 3s. 9d., or 46 p.ct.

The extra cost of collection over the ordinary consumption is 1½d. per 1000 c.ft. The cost of the maintenance and repairs of the automatic portion of the meter is more costly than the ordinary meter, and requires considerably more attention.

Owing to the liability of the automatic part of the meter to get out of order, there is a bigger loss of revenue proportionately than in the case of the ordinary meter; as, when a defect arises, it is extremely difficult to agree a computation, and almost invariably some concession has to be made to the consumer compared with the corresponding quarter of the previous year.

In some few cases coin-meter consumers have asked for a larger stove than the free stove. In these cases they, of course, pay a stove-rent, and the cost of collection is proportionately heavy—it being repeatedly found necessary at the end of the quarter to disconnect some of the stoves in order to collect the rents due. The Committee will, therefore, appreciate that it would not be economical to introduce the system of charging a flat-rate to automatic consumers on the same basis as the ordinary consumers, and collecting separately the rental of the stove.

The majority of the consumers by automatic meter have from preference adopted this system of payment, and to meet their own personal convenience. They are at liberty if they wish to have the gas supplied by ordinary meter, in which case they are asked to pay the usual deposit as security for their quarterly accounts, unless payment is guaranteed by some member of the Council or other reliable local person.

To prevent consumers changing too frequently from one class of meter to the other, it was decided on May 15, 1895, that in cases where an ordinary consumer wished to transfer to a prepayment meter, or *vice versâ*, a fee of 2s. 6d. be paid, and in the event of the consumer deciding later to revert, a further charge of 5s. be made.

GLASGOW CHEMICAL WORKS REPORT.

Mr. Walmsley, the Manager of the Glasgow Corporation Chemical Works Department, has issued his first annual report.

In the course of it, he states that, with the plant already erected and that being installed at the Dalmarnock chemical works, they will be able by the next winter season to double the tar plant, and increase the sulphate plant by two-and-a-half times that available last year. There will thus be ample time to cope with all immediate and future demands at Dalmarnock.

The revenue for the past year increased by 84 p.ct.—from £37,591 to £70,038; and, after deductions for manufacturing expenses, repairs, rents and taxes, &c., the increase was 67 p.ct.—from £15,258 to £25,469. Management expenses this year are estimated to be £687, as against the £250 put down for management last year. Advances in wages during the year amounted to an average increase of 8s. per man per week; while for the current financial year, a further advance of 3s. per week came into operation as from June 2. Increases in the cost of all materials have also had to be faced. The net revenue increased from £22,692 to £44,569; coals carbonized, from 87,890 tons to 101,517 tons—the money values of which were, respectively, 5s. 2d. and 8s. 9½d. per ton of coal carbonized. The average prices (per ton of coal carbonized) received from the chemical contractors with whom the department deal were: At Provan, 8s. 3·63d.; at Dawsholm, 6s. 9d.; and at Tradeston, 7s. 1·65d. The Dalmarnock figure was 8s. 9·27d., or about 5½d. above the Provan figure (and this in spite of the fact that sulphuric acid for making the sulphate was delivered under rebate to the contractors at the other works, representing 10d. per ton of coal carbonized), and 1s. 4·87d. per ton of coal carbonized above the average of the other three works.

PATENT OFFICE REPORT.

The thirty-seventh annual report of the Comptroller-General of Patents, Designs, and Trade Marks, for the year 1919, states that there were 32,853 applications for patents, as compared with 21,839 in 1918, and 19,285 in 1917. Last year's number is, in fact, 1901 higher than that recorded in any previous year. The receipts from patent fees were £364,381; the total receipts of the office being £404,475, compared with £345,405 in 1918, an increase of £59,070. The surplus of receipts over expenditure was £54,324. The amount received from patent renewal fees again exceeded the previous best; the figure being £247,408, as against £232,629 in 1918.

In addition to the increase of 11,014 in the number of patent applications last year, as compared with 1918, there was an equally notable increase in the complete specifications filed, which numbered 18,922, as against 13,263, an increase of 5659, or 42·7 p.ct. The applications made by way of communications from abroad numbered 1320, compared with 787 in 1918. The number of new patents sealed in 1919 was 12,301. There were 22 applications granted for the restoration of patents which had lapsed in consequence of the non-payment of renewal fees. Four petitions for extension of term—one relating to a patent of the year 1905, and three to patents of the year 1906—were lodged. The first-mentioned case has not yet been decided; while as regards the three patents of the year 1906, consideration of the petitions has in two instances been adjourned *sine die* by the Court, in view of the terms of the Patents and Designs Act, 1919; and similar action will doubtless be adopted in the third case.

The Patents and Designs Act, 1919, makes a number of minor amendments in the law which the experience gained in administering the Act of 1907 had shown to be necessary or desirable; and there are also a certain number of new provisions. One section sets-up a complete scheme for the granting of relief from the abuse of monopoly rights under a patent. Another provides for the endorsement of a patent with the words "licences of right." Any person will be entitled as of right to a licence under a patent so endorsed, upon terms to be settled, failing agreement, by the Comptroller. Section 6 extends the term of a patent from fourteen years to sixteen years.

The names of nine patent agents were added to the register during the year; the total number on the register at Dec. 31 being 246. By the Register of Patent Agents Rules, 1919, dated Feb. 26, provision was made for holding an intermediate examination, as well as a final qualifying examination, for persons desirous of being registered as patent agents. A copy of these rules is issued with the report.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *July* 12.

The London tar products market maintains a good tone; prices generally being firm. Pitch is in strong demand, and there are buyers for next season's delivery at well over 170s. per ton. Creosote is steady at about 1s. 3d. per gallon net and naked. Pure benzol, pure toluol, and 95/160 solvent naphtha are all at about 3s. 6d. per gallon net at makers' works. Naphthalenes are in great request, and supplies are scarce. Pyridine bases are quoted at 20s. per gallon net filled into buyers' drums.

Sulphate of ammonia remains unchanged; the price for the current month being £23 per ton, basis 24⅝ p.ct. to dealers.

Tar Products in the Provinces.

July 12.

The average values for gas-works products during the week were: Gas-works coal tar, 106s. 6d. to 111s. 6d. Pitch, East Coast, 170s. to 175s. per ton f.a.s.; West Coast—Manchester, 170s. to 175s.; Liverpool, 170s. to 175s.; Clyde, 170s. to 175s. nominal. Benzol 90 p.ct. North, 2s. 6d. to 2s. 7d.; crude 65 p.ct. at 120° C., 1s. 8½d. to 1s. 9d. naked at makers' works; 50-90 p.ct. naked, North, 2s. 4d. to 2s. 6d. Toluol, naked, North, 2s. 6d. to 2s. 7d. nominal. Coal tar crude naphtha in bulk, North, 11½d. to 1s. Solvent naphtha, naked, North, 3s. 1d. to 3s. 3d. Heavy naphtha, North, 3s. 4d. to 3s. 6d. Creosote, in bulk, North, liquid, 1s. to 1s. 0½d.; salty, 11½d. to 1s. Heavy oils, in bulk, North, 1s. to 1s. 0½d. Carbolic acid, 60 p.ct., 4s. to 4s. 1d. Naphthalene, £35; salts, £9 to £9 10s., bags included. Anthracene, "A" quality, 9d. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

The strike of gas workers in the North is likely to have serious effect on the supply of tar products, the market for which is accordingly somewhat unsettled. It cannot be said, however, that there is any tendency to weakness in any direction—indeed, the movement towards a higher range of values continues, and many of the most conservative firms in the trade are still looking for higher quotations. Pitch has passed £9 per ton; and orders are being booked for delivery throughout the next shipping season at prices in excess of this. The home demand is good, and South Wales buyers have found themselves in much difficulty by reason of their persistence in refusing to recognize the trend of events. Naphthalenes are still much wanted, particularly the refined. Crude is not much changed; but the firelighter industry will be coming into the market again shortly. Naphthas are rather harder, especially solvent. Carbolic acid remains without much change; but cresylic acid is dearer, and creosote continues in good request. Intermediate products are none too plentiful, and manufacturers are booked up for months ahead at very remunerative rates. Aniline oil and salts are in demand, and salicylic acid (technical grade) is inquired for at a slight improvement in value.

Latest quotations are as follows:

Benzol: 90% London 2s. 5d. to 2s. 7d., North 2s. 4d. to 2s. 6d.; 50-90% 2s. 3d. to 2s. 4d. London, 2s. 2d. to 2s. 3d. North; crude 60-65%, 1s. 6d. to 1s. 8d.; pure, 4s. per gallon naked.

Crude Tar: London, 87s. 6d. to 90s.; Midlands, 85s. to 87s. 6d.; North, 85s. to 90s. per ton *ex* works. Refined tar, 65s. per barrel (free) on rail.

Pitch: London, 190s. per ton; East Coast, 185s. to 190s. per ton; West Coast, 185s. to 190s., with Manchester 190s. per ton, and Glasgow 190s. per ton; South Wales, 195s. per ton.

Solvent Naphtha: London, 3s. 6d. Provinces average 3s. 4d. per gallon.

Crude Naphtha: Naked, 10d.; North, 9d. per gallon.

Heavy Naphtha: 3s. 8d. per gallon.

Naphthalene: Refined, £48 per ton nominal; inferior, £35; crude, £14 to £22, according to quality.

Toluol: Naked, 2s. 9d. per gallon nominal. North, 2s. 7d. Pure, 4s.

Creosote: London, 1s. 1½d. to 1s. 2½d.; North, 1s. 1½d.; heavy oil, 10½d. per gallon in bulk.

Anthracene: 40-45%, 9d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Pyridine: 20s. to 25s. per gallon.

Aniline Oil: 1s. 9d. to 1s. 10d. per lb., drums extra.

Aniline Salts: 2s. to 2s. 3d. per lb.

Cresylic Acid: 95%, 4s. 9d. to 5s. 3d.; 97-99%, 5s. 6d. to 5s. 9d. per gallon *ex* works London, f.o.b. other ports.

Carbolic Acid: Crude 60%, 4s. 8d. per gallon; crystals 40%, 1s. 3d. to 1s. 4d. per lb. (nominal).

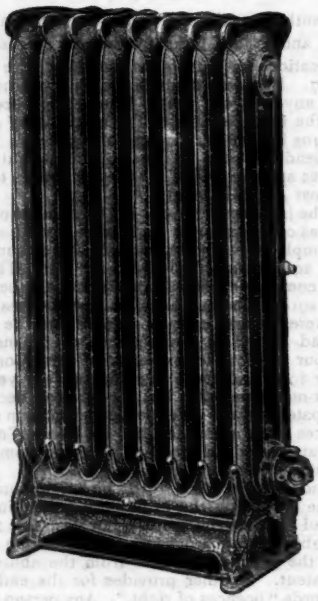
Salicylic Acid: Technical, 3s. 3d. to 3s. 6d.; B.P., 3s. 9d. per lb.

Xylol: Pure, 6s.; commercial, 4s. 9d. per gallon.

Sulphate of Ammonia.

There is not much change in the home position.

Orders are coming along satisfactorily at the fixed rates; the month of August being rather favoured by buyers—possibly because the harvest will practically be out of the way, and they can give some attention to the proper storage of the fertilizer. Export business is assuming rather more important dimensions for the time being, and prices realized are highly satisfactory. This export demand, however, will not be satisfied after another two months, as home requirements will then be coming to the front. Conditions in Germany are said to be improving; and that country may shortly again enter the lists of exporters of this fertilizer. Synthetic ammonia production has developed rapidly and extensively; and it is said to be only a matter of months before the effect of German competition will be felt.



The "St. Andrew" Gas-Steam Radiator.

"ST. ANDREW"
Gas-heated Steam
RADIATORS

Three strong recommending features of these successful radiators may be stated.

Simplicity. Nothing so efficient could be simpler. They can be fixed quite easily in any position where a gas-supply pipe can be connected. It then only needs the gas lighting when required and turning out when done with. No other labour is involved.

Effectiveness. Immediately the gas is lighted, the warmth diffuses in the room until an agreeable healthy heat is attained. The temperature is maintained all the time the radiator is in use, without further attention. There is no noise, no smell, no danger.

Economy. Time is saved. Labour is minimised. The gas consumption is automatically controlled and the utmost economy effected. No gas is burned needlessly.

MANUFACTURED BY
JOHN WRIGHT & CO.,
ESSEX WORKS, ASTON,
BIRMINGHAM.

Damage to Buildings by Smoke.

The revelations with regard to the condition of Westminster Abbey have led to some correspondence in "The Times:" and among the letters which appeared last Wednesday was one in the following terms from Dr. H. A. Des Vœux, the Hon. Treasurer of the Coal Smoke Abatement Society: "The appeal on behalf of Westminster Abbey must find an eager response from the whole Anglo-Saxon race, whether they be inhabitants of these islands or the lands beyond the seas. This is the monument of our nation—nay, more, of our race. This monument is being destroyed; and the destruction is attributed to the 'weathering' of the stone. Now, it is important to realize the exact significance of that expression. In country districts many ancient buildings have retained their beauty, and have remained undamaged, although exposed to the fretting action of wind, rain, and frost, because they are immune from the action of gases emitted in the smoke from industrial as well as from domestic chimneys. Each particle of soot contains tar and sulphuric acid. The former adheres to the stone; while the latter, with or without the influence of rain, combines with the alkali in the stone and rapidly produces decay. So mighty is this evil that decay is apparent even in parts of the Abbey which were restored less than 25 years ago. It follows that to ascribe to 'weathering' the injury now being inflicted on Westminster Abbey is incorrect; the only effect of weather being to vary the manner of destruction by smoke, not to cause it. Practically all ancient buildings in towns are similarly more or less affected—Canterbury Cathedral and the beautiful Oxford colleges, for example. How long is this to be allowed to continue? Destruction of our monuments goes hand in hand with waste of our only source of power—coal. A few have raised a voice of protest, but are not listened to. Will the stricken Abbey awaken us from our careless neglect of our trusteeship?"

Chesterfield Gas-Works Fatality.—Joshua Moore, while employed in the yard at the Chesterfield Gas-Works on Monday, was so severely crushed between two coal wagons that he died a few hours after his removal to the Royal Hospital.

Dundee Gas Accounts.—The statement of accounts before the Dundee Gas Commissioners last week showed that they are in debt to the amount of £74,144—a temporary loan by bankers. The price of gas for the current year was fixed at 3s. 2d. per 1000 c.ft., less 5 p.ct. discount—an increase of 1d.

Selby Gas-Works Improvements.—An inquiry on behalf of the Ministry of Health was recently held locally by Major Stewart, in connection with an application by the Selby Urban District Council for sanction to borrow £5000 for gas-works extensions. It was said that there were 2450 houses in the area, 500 of which were not served with gas, and that by the new proposal the supply would be increased 50 p.ct. There was no opposition to the scheme.

Melbourne Gas Strike Settled.—A Reuter's message states that a mass meeting of the Gas-Workers' Union has empowered the Trades Disputes Committee and the Union officials to settle the Melbourne strike in accordance with the Metropolitan Gas Company's offer previous to the cessation of work.

Minimum Rate at Bradford.—The minimum rate of 1s. 6d. per hour, as suggested by the Provincial Industrial Council, is recommended to be paid to manual (general) labourers of the Bradford Corporation. This refers to non-trading undertakings only. A guaranteed week of 47 hours to those receiving the minimum rate as and from March 29 last is also recommended. A recommendation is made for the formation of a small Sub-Committee to go into the question of the submitting of a graduated scale for various classes of work in the Corporation departments, differential treatment to be meted out between those workmen who have a guaranteed week's work and those who have not.

Helmsley Gas Company's Troubles.—Helmsley (Yorks.) users are already paying 10s. per 1000 c.ft. for gas; and recently they were called together and informed that, if they would not pay 13s. 4d. in future, the Gas Company would have to close down. It was pointed out that, even at this price, it was not a case of helping the Company to make a profit; but the consumers were asked to burn more gas, so as to assist the Company to carry on. At the same time, the Company would very much like a profit to set against five years' loss. The consumers and shareholders decided to acquiesce in 13s. 4d.; but one criticized the methods in operation at the works. It was stated that a large quantity of gas had been escaping; and the suggestion was made of further financial help for the Company, in order that plant could be procured which would tend to more economical working.

Fatal Accident at the Huddersfield Gas-Works.—At an inquest at Huddersfield last Wednesday on the body of Charles Hirst, driver of a machine-charger at the gas-works, a verdict of "Accidental death" was returned. Hirst fell from a staging on the previous Sunday night and fractured his skull—dying in the infirmary. He was 51 years of age, and had worked at the gas-works for 20 years. Arthur Warren, stoker, said when Hirst had charged the stoker he climbed to the top of the machine by a ladder because a slide failed to act. He seemed to lose his balance in trying to shut the slide by hand. He fell about 20 ft. and struck a small dynamo. Witness did not think deceased would receive an electric shock when trying to shut the slide. Mr. H. Singleton, the Gas Manager, explaining the working of the machine, said the place was not as well lighted as it should be. James Ellis, foreman, said the machine was not out of order, but bits of coal sometimes got between the slides, making them difficult to shut. It would be an improvement to have a better light at the top; but the dust from falling coal would to some extent obscure the view of a man on the top. The Coroner, in returning his verdict, called attention to the need for better light. Mr. Proctor, for the Corporation, expressed sympathy with the relatives, and said that the question of lighting would be attended to.

Main's "Housing" Cookers.

HOUSES are building slowly yet surely, and the Government Department concerned with the nation's need in this respect has made its selection of cookers suitable for present and future schemes.

The Main "Surrey" Cooker on stand was an early choice, and this popular Stove has already been supplied in large numbers to those districts fortunate enough to have schemes certificated by Government.

The design, dimensions, finish, and price of the "Surrey" Cooker make it ideal in every respect.

May we send you our "Housing Problems" booklet. It will assist you with the Housing Schemes in your District.

R. & A. MAIN, LTD.

WORKS: Gothic Works, EDMONTON, N.18; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.1; 82, Gordon Street, GLASGOW; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 6, Narrow Wine Street, BRISTOL; 333, Queen Street, MELBOURNE.

Oldbury Vertical Retort Scheme Withdrawn.

At a meeting of the Oldbury Urban District Council on Wednesday last, the Gas Manager reported that the quantity of gas sent out during last month was 13,880,000 c.ft., against 12,990,000 c.ft. for the corresponding month last year. The quantity sent out to date was 26,895,000 c.ft., against 25,712,000 c.ft. for the same period last year. It was reported the Committee had considered a report, presented by the Manager, upon the manufacturing plant, and recommended: (*a*) That a system of vertical retorts be installed at the gas-works, at an estimated cost of £38,000, subject to the sanction of the Ministry of Health being obtained to the necessary loan to cover the estimated expenditure incidental thereto. (*b*) That the tender of West's Gas Improvement Company, Ltd. (being the lowest), for the supply of one installation of vertical retorts be accepted. The Committee also recommended that the price of gas to all consumers be increased by 2d. per 1000 c.ft. as from the June reading of the meters. Mr. Heaton moved the adoption of the report. The clause relating to the recommended reconstruction at the works was considered at some length; and ultimately an amendment was carried to reject this part of the report. Mr. Chance, in seconding the adoption of the report as amended, said that, by increasing the price of gas by 2d. now, he hoped it would save putting on a larger increase towards Christmas. Mr. Watson said he considered it was very unfair at the present time to put 2d. on the price of gas. They were clamouring for new industries to come to the district, and then they retarded them by increasing the cost of motive power gas. He moved that it be deferred until the balance-sheet had been prepared; but this was defeated, and the report was carried.

Complete Gasification Plant for Bolton.—At the Bolton Town Council, on Wednesday last, Mr. W. Heaps (the Chairman of the Gas Committee), said the Committee, during the war, kept their plant in good repair, and to-day they were reaping the advantage when many works were finding difficulty in getting repairs done. The great drawback the department had suffered had been in having to make extensive repairs to their vertical retorts. This had meant that fully 43 p ct. of the gas had to be made at the Gas Street works; and horizontal retorts only yielded a little over 12,000 c.ft. of gas per ton of coal, as against 16,000 c.ft. from verticals. The new retorts would represent the last word in gas-making plant, and would meet their requirements for a low-grade gas. A third of their condensers required renewing, and other portions of the plant needed overhauling and extending. The Council had also agreed to purchase a complete gasification plant. The plant totally destroyed the coal—making nothing but gas. They expected to get a yield of at least 60,000 c.ft. of gas per ton of coal, without residuals. During the past year they had a record sale of gas for domestic purposes. The income was over £300,000, against £254,000 in 1915. The cost to manufacture and distribute gas in 1915 was £52,236. Last year the cost of manufacture, leaving coal out of the question, was £100,643.

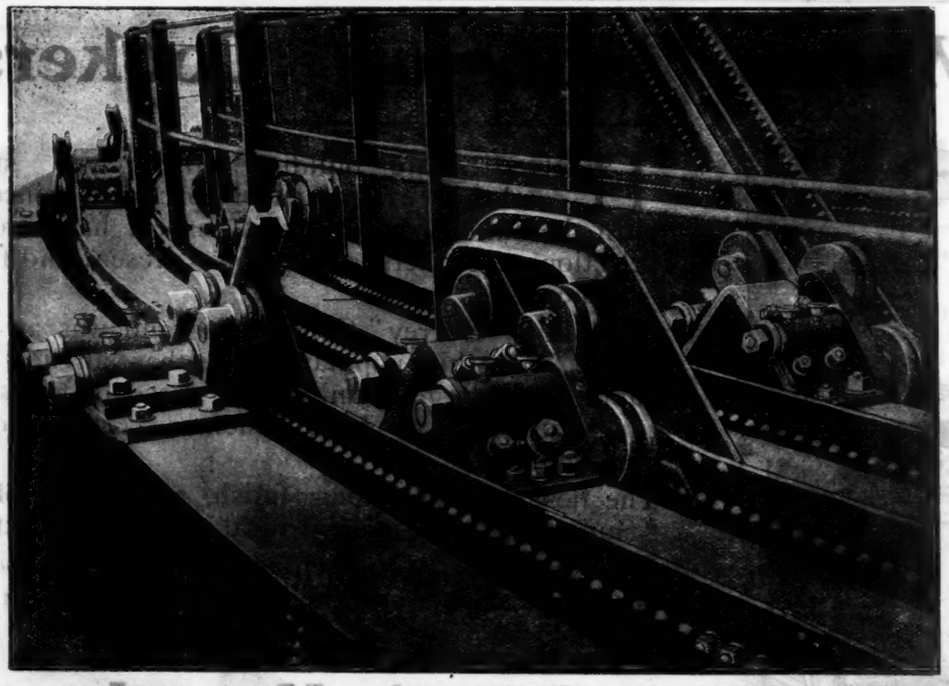
Extensions at Hartlepool.—At a special meeting of the Hartlepool Gas and Water Company last Thursday, it was decided to borrow, by the issue of redeemable debentures or debenture stock, a sum not exceeding £150,000, for a period or periods not above twenty years. The money is required for reservoir extensions, gas-works extensions, carburetted water-gas plant, and redemption of loans.

Vertical Retort Scheme for Wallasey.—A Ministry of Health inquiry has just been held at Wallasey relative to an application by the Corporation for sanction to borrow £161,000 to cover expenditure contemplated in connection with the gas undertaking. Of the total amount, £125,000 is required for the installation of vertical retorts, £24,000 for compressing apparatus to secure an even distribution of pressure, and the balance for new mains and alterations at the works.

Hull Street Lighting.—After negotiations, the Hull Corporation and the British Gas Light Company have agreed upon new terms for street lighting. These provide that, for every 1s. per ton increase in the price of coal, the charge per lamp per annum shall be advanced 1s., instead of 1s. 6d.; and that for every 1s. per week increase in wages the charge per lamp shall be increased 8d., instead of 1s. 6d., as in the old agreement. These conditions are to operate as from Jan. 1 last.

Price of Gas in the Brighton District.—At last week's meeting of the Shoreham Urban District Council, their position in regard to the Bill of the Brighton and Hove Gas Company was submitted by the Clerk (Mr. J. E. Dell), acting on behalf of the Joint Committee which opposed the Bill. He stated that the Company would be able to charge a standard price of 5s. 6d. per 1000 c.ft. as from June 24, instead of the 6s., the standard asked for. In regard to the charge for the past quarter, it was stated that the Company had by advertisement notified an increase from 4s. 5d. to 5s. in the standard charge; but Mr. Dell considered that this was illegal. It was decided that if the Company should charge the extra amount for last quarter the Joint Committee would fight a test-case. The Chairman considered that the result of the opposition to the Bill had been most satisfactory.

Worthing and its Gas Price.—At the last meeting of the Worthing Town Council the Town Clerk reported the receipt of a notice from the Worthing Gas Company of their intention to apply to the Board of Trade to raise their price from 5s. 8d. per 1000 c.ft. as from the 1st inst. to 6s. He was able to state that since Dec. 31 last the extra cost of coal (at £2 7s. 8d. per ton, as against £1 17s. 11d.) and wages alone were equivalent to just over 4¾d. per 1000 c.ft.; while the cost of repairs for the half year ended Dec. 31, 1919, was 2·6d. per 1000 c.ft. sold higher than for the year to June 30. No account was taken of the pending demand for an increase of 10s. per week in wages. It was resolved not to oppose the proposal, but that in view of the fact that the Council would not meet until after the last day for lodging objections, the Town Clerk be instructed to formally object, in order to preserve the *locus standi* of the Council in case it desires to oppose the application.



THE NEW "BEARSCOT" TWIN GUIDE ROLLERS

R. & J. DEMPSTER, LTD.,

London Office:
34, VICTORIA STREET,
WESTMINSTER, S.W. 1.

MANCHESTER.

Kendal Gas-Works Annual Report.

Mr. W. R. Wilson, the Manager of the Kendal Corporation Gas Department, in his annual report to March 31, stated that the gross profit amounted to £6728, to which was added £424 interest on reserve, &c. After setting aside £4178 for interest and sinking fund, and a small sum for war allowances, a surplus was left of £2956. The reserve fund remains at £5000, and the sinking fund (including debt repaid) at £26,278. During the year the coal carbonized amounted to 6657 tons, being an increase of 497 tons, or 8·07 p.ct. over the previous year. The total cost of the coal delivered to the works has been £12,716—38s. 2d. per ton. The total quantity of gas made was 105,832,800 c.ft., or an increase of 9,072,800 c.ft.—9·38 p.ct. The quantity of gas sent out from the works (including public lamps) was 97,308,100 c.ft., or an increase of 9,367,700 c.ft. (equal to 10·65 p.ct.). There are at present 2048 ordinary and 2127 prepayment consumers; showing a decrease of 17 consumers over last year. The number of cookers in use on March 31 was 1718. The receipts for coke showed an increase of £847; for tar, £1015; and for sulphate of ammonia, £177. For the first time in the history of the Kendal Gas-Works, the annual make of gas has exceeded 100 millions (105,832,800 c.ft.), and the question of an extension of the carbonizing plant to meet the growing demands will need early consideration. The vertical retort plant continues to give excellent results, as is shown by the record yield of 15,897 c.ft. per ton of coal carbonized. The cost of coal increased from 31s. 3¾d. to 38s. 5¾d. during the year, with a further rise of 4s. 2d. (to 42s. 7¾d.) as from May 12 last. Taking as a basis 26s. a week above pre-war rates of wages, labour was increased 5s. per week as from May 1 last year, and again 4s. per week as from Dec. 1. The price of gas was raised 5d. per 1000 c.ft. (to 4s. 2d.) as from July 1, 1919, equal to an increase of 1s. 8d. or 66·67 p.ct. above the pre-war rate of 2s. 6d. per 1000 c.ft.; and it is hoped any further increase will be unnecessary.

Carlisle Gas Accounts.—The accounts of the Carlisle Gas-Works for the year ended March 31 show a gross profit from the manufacture and sale of gas and residuals of £32,253, as compared with £14,278 in the previous year. The net profit is £21,181, to which has been added £7792 brought forward.

Gas Prices at West Bromwich.—At a meeting of the West Bromwich Town Council last Thursday, it was agreed to advance the price of gas 6d. per 1000 c.ft.; the Mayor (Alderman Cox) pointing out that this course was rendered necessary by the increased outlay on production. Wages and coal for the year had increased by £17,550; and to meet this, the Committee had already increased the price by 6d. in December and another 6d. in February. The increase for the past financial year amounted to £11,550. The price advances mentioned would bring in £20,385; so that there was a balance to be made up of £8835. The present increase would produce £8626. The year's accounts showed a net profit of £2083, as compared with a net loss last year of £926.

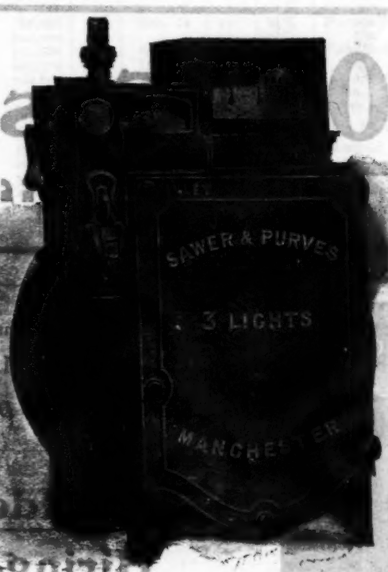
Stourbridge Gas-Works and the Rates.—The Stourbridge Town Council have decided to increase the price of gas 6d. per 1000 c.ft. Several members opposed the increase, and urged that the Committee should sell gas at the lowest possible price, instead of endeavouring to make profits to be devoted to the relief of the rates.

Larkhall Gas Company.—At the meeting of the Larkhall Gas Company the total amount available for dividend for the past year was stated to be £3492. The sum of £1116 was set apart for the payment of a dividend of 12½ p.ct., free of income tax, and £2375 was carried forward. The report was considered very satisfactory.

Theft of Gas.—At Bradford last Thursday, Demaine Berry and his wife, Eleanor Berry, of No. 14, Railway Terrace, Low Moor, were summoned for stealing gas from the Corporation mains after their supply had been cut off at the meter. An inspector, upon visiting defendants' house, found a gas-ring burning on the table, and on going down into the cellar saw that an india-rubber pipe had been attached to the main and roughly connected with putty. The husband denied all knowledge of the offence; but his wife acknowledged to it. A fine of £2 10s. and of £2 10s. for the gas was imposed on each defendant; making £10 in all. The Stipendiary Magistrate (Mr. Beaumont Morice) characterized the offence as a mean and despicable one for persons in the position of defendants.

Imperial Continental Gas Association Claim against Germany.—Referring to a sharp rise which occurred in Imperial Continental Gas Association stock last Thursday, "The Times" on the following day remarked that this was accompanied by a rumour on the Stock Exchange that a circular bearing on the Association's war claim against Germany was being sent-out to the stockholders. We have, said our contemporary, authority for stating that this is not the case. What has happened is that the Association have taken steps to bring their claim for compensation on account of the liquidation of their German business before Parliament, in view of the delay that has occurred in the carrying-through of the preliminaries to a settlement. From the point of view of the Association, whose claim amounts to about £11,000,000, this delay is a matter of serious concern.

Improved Financial Position at Accrington.—Alderman Dewhurst (the Chairman), at a meeting of the Accrington Gas Board last Thursday, said despite an increased expenditure of over £20,000 during the year, it was hoped to carry-on for the time being without increasing the price of gas. Last year was the first profit they had made for six years; and considering the price of fuel, wages, &c., he considered they had achieved much. Mr. A. J. Harrison (the Manager) said the Board were now paying an advance of 190 p.ct. on some wages; and further increases had been granted which would cost the Board £8000 this year. The Ministry of Health have sanctioned the loan for £133,000 for the new gas-works at Great Harwood. It was stated that the report sent in to the Ministry by the Manager was so satisfactory that not a single query had been put during the negotiations.



PREPAYMENT METERS

WET AND DRY

Telephone Nos.:
2289 (City) MANCHESTER.
2025 (Central) NOTTINGHAM.

Wires
"SAWER MANCHESTER."
"SAWER NOTTINGHAM."

SAWER & PURVES

(BRANCH OF METERS LTD.)

MILES PLATTING
MANCHESTER

RADFORD ROAD
NOTTINGHAM

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for July 7.]

Nos. 17,478—18,528.

ANDERSON, D.—"Gas-mixers." No. 18,491.
BALE, G. F.—"Apparatus for destructive distillation of carbonaceous material." No. 18,145.
BLAND LIGHT SYNDICATE.—"Regulator for incandescent gas-burners." No. 17,708.
CHAUVEAU, L. L. E.—"Automatic switch for distant control." No. 18,277.
COLLIN AKT.-GES. ZUR VERWERTUNG VON BRENNSTOFFEN UND METALLEN, F. J.—"Process of producing ammonium sulphate from cyanogen compounds." No. 17,974.
COLLIN AKT.-GES. ZUR VERWERTUNG VON BRENNSTOFFEN UND METALLEN, F. J.—"Method of discharging ammonium sulphate from saturator baths." No. 18,165.
COLLIN AKT.-GES ZUR VERWERTUNG VON BRENNSTOFFEN UND METALLEN, F. J.—"Method of sealing retorts and oven chambers. No. 18,166.
DAVIS, W. J.—"Geyser." No. 18,385.
DEMPSTER, R. & J.—Combined coal carbonization and gas-making plant." No. 18,076.
DEMPSTER, R. & J.—"Combined generating and heating plant for manufacture of hydrogen." No. 18,438.
DÖHLE, F.—"Process for casting pipes, &c." No. 18,185.
FOUCAULT, J.—"Pipe-unions." No. 17 931.
FREYTAG, W.—"Process for washing gases and vapours." No. 18,319.
FRISCHER, H.—"Process for obtaining oxides of nitrogen from ammonia." No. 17,522.
GETTING A. ET JONAS, G.—"Endless mechanical conveyors." No. 17,563.
GLOVER, T.—See Bland. No. 17,708
GOLDSCHMIDT AKT.-GES.—"Process for separate recovery of constituents of distillation gas from fuel." No. 18 266.
HOLZWARTH, H.—"Cooling gas-turbines." Nos. 17 692, 17,694.
HYDE, J. B.—"Steaming horizontal gas-retorts." No. 18,102.
INTERNATIONAL PRECIPITATION CO.—"Apparatus for electrical treatment of gases." No. 17,744.
JAMIESON, J.—"Pipe-couplings." No. 18,465.
JONES, D. J.—"Gas-furnace." No. 17,717.
KING, L. F.—Gas lighting and heating." No. 17,501.
KLÖNNE, A. [FIRM OF].—"Gas-producer furnaces." No. 17,781.
KNIGHT, H. S.—See Dempster. Nos. 18,076, 18,438.
LANGIONE, A.—"Devices for controlling supply of gas." No 17,515.
MOND, A.—See International. No. 17,744.
NISSEN, H. G.—"Gas-steam turbines." No. 18,365.
OSTHOFF, W.—"Regulating width and intensity of flames of gas-singeing machines." No. 17,868.
PERKIN, F. M.—See Bale. No. 18,145.
POCOCK, S. J.—"Gas-meters." No. 18,431.
REID, G. R.—"Means for indicating level of coal in hoppers, &c." No. 18,297.
RENNISON, F. T.—"Gas-fired furnaces." No. 17,871.
SACHARELO, M.—"Pressure-regulator for compressed-gas blow-pipes, &c. No. 17,865.
SASSI, G.—"Gas, &c., compressors, pumps, &c. No. 17,867.
SIDDALL, F. J.—See Dempster. Nos. 18,076, 18,438.
STOTT, J.—"Means for regulating fluid pressures." No. 17,653.
TANOMURA, G.—"Drawn pipes, and process of stretching same." No. 18,272.
VERITY, O. R.—"Gas-producers." No. 18,457.
WALSH, E. W.—"Stop-leak for pipes." No. 17,534.

The loss on the Batley Gas-Works for the past year is stated to be over £6000. This has, in the main, been caused by the heavy repairs which have had to be paid for out of revenue.

A fire which broke out at the rear of the offices of the British Gas Light Company at Hull destroyed two floors of a building heavily stocked. Considerable damage was done. The cause of the outbreak is unknown.

The Dublin Dockyard Company, Ltd., some days ago launched from their yard at North Wall, on the Liffey, the steamer "Brockley." This is the eighth steamer the firm have built for the South Metropolitan Gas Company.

The Bradford gas main and service layers are being recommended by the War Wages Committee for an advance in wages of 1½d. per hour as and from Jan. 23 last, to bring their rate of wages into line with those paid to the water-main layers.

At the Swansea Gas-Works last Wednesday, Mr. John Glasbrook (the Chairman of the Company) unveiled a memorial tablet erected by the employees, in memory of their comrades who died in the war. The Rev. Canon Watkin Jones conducted a brief service. Short speeches were made by Mr. George Andrews (Deputy-Chairman), Mr. W. H. Johns (Engineer and Manager), Mr. C. Dyer (workmen's representative), and Mr. E. Ablett (Secretary and Assistant Engineer).

The Local Government Board for Ireland have made their findings on the evidence heard at an inquiry at Brookeborough (co. Fermanagh) into charges by ratepayers of, as alleged, maladministration by the committee in charge of the local acetylene gas lighting. The Board hold that the charges were proved, and allow complainants their costs. They order that the private gas consumers are to pay at the rate of the average for the past five years, and, further, that in future such consumers shall pay at least two-thirds of the cost of the lighting.

"CANNON" Gas Cookers

The "COUNTY"

Still maintains its POPULARITY, OWING TO ITS MANY ADVANTAGES. . .

UP-TO-DATE IN CONSTRUCTION.

An Ideal Cooker for Hiring-Out Purposes.

CANNON IRON FOUNDRIES, LTD.,

DEEPFIELDS, Nr. Bilston, Staffs.

London Office and Show-Rooms:—

BATH HOUSE, 57-60, HOLBORN VIADUCT, E.C.

Australasian Agents: MOLDEN & BUDDEN PTY., Ltd., 364A, Little Collins Street, Melbourne, Vic.; and at SYDNEY, N.S.W.

STOCK MARKET REPORT.

AFTER a chilly and uncertain opening last week, with a good deal of variability in most markets, things on the Stock Exchange on Tuesday brightened up considerably, and business became more active. The firm tone developed, and further improvement was the feature next day. This was fully sustained for the rest of the week; and the close was quite cheerful. The leading factor in this welcome production was the growing confidence in the solution of the great financial question now before us.

The gilt-edged market was firmer. Home Government issues had a moderate advance, Friday's figures for the leaders being: Consols 46⅞-47⅛, War Loan 85⅝-86 1/16, Funding 69⅝-70⅜, Victory 76½-77. War Bonds also were firm, and choice municipals were in request. Indian loans were stronger. Home Rails, after a doubtful period, advanced nicely. Canadian were moderately good, and Argentine were quite firm.

The Foreign Market was in good case generally. French Loans improved, despite a shifty exchange, and Belgian, Greek, Japanese, and South American were firm.

The Miscellaneous Market was in much improved trim. Rubbers and Oils were much firmer, and Textiles, Nitrates, and Shipping were brighter. Insurance and Iron and Steel lacked support.

Business in the Gas Market was on a reduced scale; and even the large leading issues were very moderately dealt in. However, this worked no harm; the general tone being quite satisfactory. In the London companies, there was an advance which appears to indicate that the beneficent effects of the Gas Regulation Bill's peaceful progress are maturing. Gas Light ordinary steadily advanced and closed at 58, with a rise of 3 in the quotation. South Metropolitan similarly advanced to 60, with a rise of 4. South Suburban rose 2. Imperial Continental had a regrettable experience on Thursday. Upon an ill-founded rumour as to a settlement of its claims against Germany, the stock jumped up from 125 to 138. The bubble burst next day; and it fell back to 126.

Bargains done for cash during the week were as follows: On Monday, Commercial debenture 46, 46½, European 5½, Gas Light ordinary 54½, 55⅛, 56½, ditto maximum 40, Imperial Continental 124, ditto debenture 83, Primitiva 16s. 3d., South Metropolitan 55½, 56½, South Suburban 63½, 63¾, 64, 64½. On Tuesday, Aldershot preference 58, Brentford "B" 47, Commercial 4 p.ct. 53½, ditto 3½ p.ct. 46, ditto debenture 45⅝. Continental Union 29, European 5½, Gas Light ordinary 54½, 54⅝, 55½, 56½, 56¼, ditto preference 55½, 57, Imperial Continental 123, 123½, 125, South Metropolitan 57. On Wednesday, Continental Union 28, Gas Light ordinary 55½, 56, 56½, ditto maximum 40, ditto preference 56½, Imperial Continental 124, 124½, Primitiva preference 35s., Tottenham "B" 52. On Thursday, Gas Light ordinary 58, ditto maximum 41, Imperial Continental 125, 125½, 126, 130, 133, 135, 136, 137, 138, ditto debenture 83, 83½, 83¼, South Metropolitan 57, Barnet 4 p.ct. debenture 62½, 62⅜, Redhill 4 p.ct. debenture 58⅝. On Friday, Bristol 65, European 5½, Gas Light ordinary 57, 57½, 58, ditto maximum 41, Imperial Continental 130, 129, 128, 126, South Metropolitan 56½, 60, Tottenham "B" 52½.

In the Money Market, supplies were fully equal to all demands in the earlier portion of the week; but pressure developed materially later on, followed again by relaxation at the close. Discount rates were firmer. The Bank rate is 7 p.ct., as fixed on April 15.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
182,049	Stk.	Mar. 11	4	4%	Aldershot 4 p.c. Pref.	...	58—63	58
1,551,868	,,	Mar. 26	2½	3 1/16%	Alliance & Dublin Ord.	59—64	42—47	...
374,000	,,	Jan. 15	4	4%	Do. 4 p.c. Deb.	76—79	57—62	...
280,000	5	May 13	7½	8%	Bombay, Ltd.	5¼—6¼	4¼—5¼	...
50,000	10	Feb. 26	16	16%	Bournemouth Gas and Water — 10 p.c.	29—30	8½—9	...
383,110	10	,,	7	7%	Bournemouth Gas and Water — B 7 p.c.	15—15½	9—10	...
115,000	10	,,	6	6%	Bournemouth Gas and Water — Pref. 6 p.c.	13¾—14	8—9	...
162,065	—	June 25	—	4%	Bournemouth Gas and Water — 4 p.c. Deb.	...	62—64*	...
992,045	Stk.	Feb. 12	14	30/-	Brentford A Consolid.	261—266	47—52	...
734,920	,,	,,	11	26/3	Do. B New	204—209	45—50	47
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	70—75	...
221,400	,,	June 10	4	4%	Do. 4 p.c. Deb.	91—93	63—65	...
274,775	,,	Mar. 11	11	7½%	Brighton & Hove Orig.	208—213	121—126	...
344,200	,,	,,	8	5½%	Do. A Ord. Stk.	154—159	80—85	...
1,287,500	Stk.	Feb. 26	5	5%	Bristol 5 p.c. max.	...	...	65
530,000	20	April 14	12½	10%	British	44—45	22—24	...
120,000	Stk.	June 25	4	4%	Do. 4 p.c. Deb. Stk.	88—90	57—59*	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	45—48*	...
100,000	10	May 27	—	—	Cape Town & Dis., Ltd.	1¼—2¼	7—7½	...
100,000	10	,,	—	4½%	Do. 4½ p.c. Pref.	4—6	5¼—6½	...
100,000	Stk.	June 25	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	56—61*	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	...	...
1,513,280	,,	Feb. 26	5/9/4	33/8	Commercial 4 p.c. Stk.	106—108	51—56	53½
560,000	,,	,,	5½	26/8	Do. 3½ p.c. do.	103—105	44—49	46
475,000	,,	June 10	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	45—47	43½—46½
800,000	,,	Dec. 11	4	—	Continental Union Ltd.	76—79	27—32	28—29
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	40—60	...
51,600	,,	Feb. 26	14½	10 1/4%	Croydon A 10 p.c.	...	130—140	...
278,400	—	,,	11½	7½%	Croydon B and C 7 p.c.	...	90—100	...
492,270	Stk.	,,	6	5%	Derby Con. Stk.	123—125	...	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	...	...
1,002,180	10	Jan. 29	10	5/0	European, Ltd.	17½—18	5¼—6½	5½
16,298,975	Stk.	Feb. 12	4/17/4	30/-	Gas Light and Coke — 4 p.c. Ord.	98—102	55—60	54½—58
2,600,000	,,	,,	3½	26/8	Gas Light and Coke — 3½ p.c. max.	76—79	37—42	40—41
4,062,335	,,	,,	4	4%	Gas Light and Coke — 4 p.c. Con. Pref.	96—99	53—58	55½—57
4,674,850	,,	June 25	3	3%	Gas Light and Coke — 3 p.c. Con. Deb.	72½—74½	45—48*	...
130,000	,,	Dec. 11	10	10%	Gas Light and Coke — 10 p.c. Bonds.	...	...	...
82,500	,,	Mar. 11	5	3½%	Hastings & St. L. 5 p.c.	...	55—60	...
258,740	,,	,,	3½	2½%	Do. 3½ p.c.	87—89	38—43	...
70,000	10	May 13	11	7½%	Hongkong & China, Ltd.	16½—16¾	8½—9½	...
86,600	Stk.	Mar. 11	9	6¾%	Hornsey 7 p.c.	...	88—93	...
131,000	,,	,,	7½	5¼%	Ilford A and C	151—154	86—91	...
65,780	,,	,,	6¼	4½%	Do. B	115—118	65—70	...
65,500	,,	June 25	4	4%	Do. 4 p.c. Deb.	92—94	55—58*	...
4,940,000	,,	May 14	9	4½%	Imperial Continental	130—160	125—130	123—138
1,235,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	80—85	83—83½
235,242	,,	Mar. 26	6½	5½%	Lea Bridge Ord. 5 p.c.	119—121	80—85	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. — A.	211—213	...	...
					Liverpool 5 p.c. Ord. — B.	146—148		
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	...	...	...
165,736	,,	Feb. 26	7/5/6	3½%	Maidstone 5 p.c.	...	52—57	...
75,000	5	June 11	6	3%	Malta & Mediterranean	4¼—4¾	1¾—2¼	...
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	89—96	...
541,920	Stk.	May 27	4	6%	Monte Video, Ltd.	11½—12	70—75	...
1,875,892	,,	Feb. 26	4½	3½%	Newcastle & Gatsh'dCon.	98½—99½	61¼—62	...
529,705	,,	June 25	3½	3½%	Do. 3½ p.c. Deb.	82—83	50½—52½*	...
15,000	10	Mar. 11	—	8½%	North Middlesex 10 p.c.	...	13—13½	...
55,940	10	,,	7/14/0	6½%	,, ,, 7 p.c.	14—15	7½—8½	...
300,000	Stk.	May 13	8	8%	Oriental, Ltd.	117—122	102—105	...
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	3—4	...
60,000	50	Mar. 11	13	7½%	Portsea Island, B	128—131	66—71	...
100,000	50	,,	12	6½%	Do. C	118—121	53—58	...
249,980	5	April 29	8	—	Primitiva Ord.	5¼—6	1—1	16/3
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4¼—5	1¾—2	35/-
521,600	100	June 1	4	4%	Do. 4 p.c. Deb.	91—93	69—71	...
600,000	Stk.	Jan. 29	4	4%	Do. ,, ,, 1911	...	47—50	...
346,198	,,	June 25	4	4%	River Plate 4 p.c. Deb.	85—87	45—48*	...
150,000	10	Mar. 26	6	6/-	San Paulo — 6 p.c. Pref.	10½—11	6¼—7½	...
125,000	50	July 2	5	5%	San Paulo — 5 p.c. Deb.	47—49	38—40*	...
135,000	Stk.	Mar. 11	10	50/-	Sheffield A	223—224	68—73	...
209,984	,,	,,	10	4½%	Do. B	223—224	58—63	...
523,500	,,	,,	10	35/5	Do. C	220—222	54—57	...
133,201	Stk.	Sept. 12	4	4%	Shrewsbury 5 p.c.	...	...	...
90,000	10	June 25	9	9%	South African	10¼—11¼	11¼—12¼*	...
6,609,895	Stk.	Feb. 12	5/4/0	30/-	South Met. 4 p.c. Ord.	111—113	56—61	55½—60
250,000	,,	Jan. 15	—	5%	Do. Pref.	...	93—95	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72½—74½	45—48	...
224,820	,,	Feb. 26	8½	3½%	South Shields Con. Stk.	157—159	99—101	...
1,087,795	,,	Aug. 14	6	3½%	S'th Suburb'n Ord. 5 p.c.	114—116	62—67	63½—64½
247,558	,,	June 25	5	5%	Do. 5 p.c. Deb. Stk.	116—118	71—76*	...
647,740	,,	May 13	7½	3½%	Southampton Ord.	99—102	57—60	...
121,275	,,	June 25	4	4%	Do. 4 p.c. Deb. Stk.	...	59—61*	...
120,000	,,	Aug. 14	—	3½%	Tottenham — A 5 p.c.	135—138	60—65	...
782,275	,,	,,	6	3½%	Tottenham — B 3½ p.c.	115—117	50—55	52—52½
181,255	,,	June 10	4	4%	District 4 p.c. Deb.	87—89	60—63	...
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Mar. 11	5	3½%	Tynemouth 5 p.c. max.	108½—109	71—73	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Feb. 26	8½	55/-	Wandsworth A 5 p.c.	151—156	83—88	...
255,636	,,	,,	6½	40/-	Do. B 3½ p.c.	129—134	61—66	...
108,075	,,	,,	—	38/6	Do. C	...	61—66	...
140,865	,,	,,	—	38/6	New Ordinary	...	61—66	...
352,000	,,	,,	6½	33/9	Wimbledon 5 p.c.	117—122	60—65	...
98,000	,,	,,	6½	40/-	Epsom 5 p.c.	121—126	60—65	...
88,416	,,	June 25	3	3%	3 p.c. Deb. Stk.	66—69	44—47*	...

* Ex Div.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON TUESDAY, to ensure insertion in the following day's issue.

Orders to Alter or Stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Monday.

UNDISPLAYED ADVERTISEMENTS: Situations Wanted, Six Lines and under (about 36 words) 3s.; each additional Line, 6d. Situations Vacant, Apparatus Wanted and for Sale, Contracts, Public Notices, &c., 9d. per Line—minimum, 4s. 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

		ONE YEAR.	HALF-YEAR.	QUARTER.
United Kingdom	Advance Rate:	28/-	15/-	8/8
	Credit Rate:	32/-	16/-	9/6
Abroad (in the Postal Union) Payable in Advance		32/6	17/-	10/-

In payment of subscriptions for "JOURNALS" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

OXIDE OF IRON

FOR SALE OUTRIGHT, OR ON LOAN.

SPENT OXIDE

PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO. LTD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.2.

"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for Gas-Works.
ANDREW STEPHENSON, Gresham House, Old Broad Street, LONDON, E.C. "Volcanism, London."

MEWBURN, ELLIS, & CO.,
CHARTERED PATENT AGENTS AND
TRADE MARK AGENTS,
70 & 72, Chancery Lane, London, W.C. 2.
Telegrams: "Patent, London." Phone 248 Holborn.
And 8, St. Nicholas Buildings, Newcastle-on-Tyne.

J. E. C. LORD, Ship Canal Tar Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

TULLY'S PATENT.
CARBURETTED HYDROGEN PLANT
for 300 to 500 B.Th.U.
COMPLETE GASIFICATION OF COAL.
BALE AND HARDY, LTD.,
89, VICTORIA STREET, LONDON, S.W. 1.

SULPHURIC ACID.

SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
SPENSER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD.,
Mark Lane, LONDON, E.C. Works—SILVERTOWN.
Telegrams—"HYDROCHLORIC, FEN, LONDON."
Telephone—1588 AVENUE (3 lines).

"FERROX." "FERROX." "FERROX."
A BRITISH Oxide Cheaper and Better than Bog Ore. 35 per cent. Water, 75 per cent. Ferric Hydrate.
For Sale outright or on Loan.
OXIDE LIMITED, Brentford, MIDDLESEX.

SPENCER'S Patent Inclined HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, May 25, p. 454.

INVENTIONS PATENTED. TRADE MARKS REGISTERED.
Advice and Handbook free. 35 years' references. Gas Patents a Speciality. KING'S PATENT AGENCY, Ltd. (Director, B. T. King, A.I.M.E., British and U.S. Regd. Patent Agent), 166, QUEEN VICTORIA STREET, LONDON, E.C.4.

BRITISH LUX.
AN EXCELLENT PURIFYING MATERIAL.
Features:—
(a) Porosity equal to Best Bog Ore.
(b) Contains Ferric Hydrate in an active state, thus resembling "Lux."
(c) Prepared in good mechanical condition ready for Purifiers.
DANIEL MACFIE, 1, NORTH ST. ANDREW STREET, EDINBURGH.

GEORGE WILSON GAS METERS, Ltd.
for
GAS-METERS, ORDINARIES, SLOTS, AND REPAIRS,
Foleshill Road, COVENTRY.
Telephone: 596. Telegrams: "GASMETER,"
and at 7/9, Grosvenor Street, C.on M., MANCHESTER.
Telephone: 3214 CITY. Telegrams: "GASMETER."
and 46 & 47, Auckland Street, LONDON, S.E. 11.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E. 1.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—
"BRADDOCK, OLDHAM," and "METRIQUE, LAMB, LONDON."

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CHEMICAL PLANT ENGINEERS, BOLTON, LANCS.
Telegrams—"SATURATORS, BOLTON," Telephone 0848.

ALDER AND MACKAY, LTD.
(ESTABLISHED 1850.)
WET AND DRY METERS,
SLOT AND ORDINARY.
STREET LAMPS AND AUTOMATIC CONTROLLERS.
EDINBURGH.
(See p. 108.)

FOR SALE.

PITCH from Gas Producer Plant, Melting at 189° Fahr.; Ash, 8 p.ct., at a Very Low Price.
Also Very Bright Hard MOND GAS PITCH, Melting at 167° Fahr.; Ash, less than 1 p.ct. 250 Tons offered. Delivery till September.
E. RUDOLPH GELL, Bye-Products Merchant, King's Norton, BIRMINGHAM.

NATIONAL ASSOCIATION OF TECHNICAL GAS OFFICIALS.
Head Office:—Temple Courts,
55, Temple Row,
BIRMINGHAM.
Full particulars for membership, &c., can be obtained from the General Secretary.

SOCIETY OF BRITISH GAS INDUSTRIES.

COPIES of the Paper on "Carbonization," together with Illustrations, presented at the Annual Meeting of the Institution of Gas Engineers, can be obtained from the SECRETARY of the SOCIETY, 46, Queen Victoria Street, LONDON, E.C. 4; price 10s. 6d., Post Free.

GAS GUILDS.

THOSE interested in the Formation of Local, District, and National Guilds of Officials of the Gas Industry are invited to communicate with the Secretary of the Newcastle and Gateshead Gas Company's Officials' Guild, D. WALTON, 16, Hartburn Place, NEWCASTLE-ON-TYNE.

APPOINTMENT, &c., WANTED.

CHIEF Clerk, Distribution, many years' Experience and Good Business Training, seeks RE-ENGAGEMENT. Good Correspondent, Typist, &c.
Address No. 6929, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

APPOINTMENTS, &c., VACANT.

WHEN Filling Vacancies, please REMEMBER THE CLAIM OF THE EX-SERVICE MAN, who, other Qualifications being equal, has the FIRST CALL ON YOUR CONSIDERATION.

NO. 6916.

APPLICANTS for the Position of DISTRIBUTION SUPERINTENDENT (No. 6916) are THANKED and Notified that THE APPOINTMENT HAS NOW BEEN MADE.

OXIDE OF IRON.
SPENT OXIDE BOUGHT.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

"TORTO" FIRE CEMENT.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

"KLEENOFF," THE COOKER CLEANSER.
Tins for Sale to Consumers.
In Bulk for Works Use.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

BRITISH GAS PURIFYING MATERIAL.
ENGLISH BOG ORE AND NATURAL HYDRATED OXIDE OF IRON.
SPENT OXIDE BOUGHT.
BRITISH GAS PURIFYING MATERIALS CO., LTD.
(W. T. P. CUNNINGHAM, Chief Proprietor and Managing Director.)
13, ARCADIAN GARDENS, WOOD GREEN, LONDON, N. 22
Telegrams: "Bripurimat, Wood, London."
'Phone: Palmers Green 608.

UNIVERSITY OF LEEDS.
(DEPARTMENT OF COAL, GAS, AND FUEL INDUSTRIES.)
RESEARCH FELLOWSHIP.

APPLICATIONS are invited up to the 20th of July for an OPEN FELLOWSHIP of £200 per Annum established by the Institution of Gas Engineers for the Prosecution of Post-Graduate Research in Gas Chemistry.
For further Particulars, apply to the SECRETARY, The University, LEEDS.

COUNTY BOROUGH OF SMETHWICK.
(GAS DEPARTMENT.)
DEPUTY ENGINEER.

THE Gas Committee invite Applications for the Position of DEPUTY ENGINEER. Candidates must be Well Trained, Energetic, and Thoroughly Experienced in up to date Carbonization Methods (including Vertical Retorts, Steaming, and Water Gas); Electrically driven Machinery, Drawing Office and Machine Shop Practice; also Well Qualified to Exercise Control of Workmen—taking Full Charge when required—and Competent to Carry Out all the usual Tests and Analyses of a Gas-Works.
Applications, endorsed "Deputy Engineer," stating Age, Qualifications, Details of Experience, and Salary required to commence, with *copies* of recent Testimonials, to be addressed to the Chairman of the Gas Committee, as under, not later than Wednesday, the 28th of July.
W. J. STURGES,
Secretary.
Gas Offices,
Council House,
Smethwick,
July 8, 1920.

COUNTY BOROUGH OF STOKE-ON-TRENT.
(GAS DEPARTMENT.)

THE Gas Committee invite Applications for the Position of ASSISTANT MANAGER to Take Charge of their Fenton Works.
Applicants must have had Experience in up-to-date Gas Manufacture and Distribution.
Applications, giving full Particulars of Age, Training, Experience, and Salary required, together with *copies* of not more than Three recent Testimonials, to be lodged with the undersigned on or before Monday, the 26th of July.
A. MACKAY,
Chief Engineer and General Manager.
Gas Offices, Longton,
Stoke-on-Trent,
July 3, 1920.

ONE or more Draughtsmen or Designing ENGINEERS, well Experienced in Gas Producer and Gas Furnace Designs, wanted by Firm in the North of England.
Address, "Z.F.," 757, care DEACONS, LEADENHALL STREET, E.C. 3.

CHEMIST Wanted—Young Man for Works Laboratory with some Experience of Coke Oven and Gas-Works Practice.
Address "CHEMIST," care of WM. PORTEUS AND CO., Advertising Agents, GLASGOW.

WORKS Chemist for Large Gas- Works. Over 27. Thorough Chemical Training and Bye-Product and Coke-Oven Experience essential. Salary, £330 per Annum, including Bonus.
Apply early to the CHIEF CHEMIST, Central Laboratory, Nechells Gas-Works, BIRMINGHAM.